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The Children's Encyclopædia

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ARTHUR MEE

Temple Chambers, London



HOLLAND THOMPSON, Ph.D.

The College of the City of New York

WITH AN INTRODUCTION BY

JOHN H. FINLEY, LL.D.

Late President of the College of the City of New York
Commissioner of Education of the State of New York

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VOLUMES VII AND VIII

London: THE EDUCATIONAL BOOK CO.

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The Book of NATURE

WHAT THIS STORY TELLS US

THE sea-birds are in some ways the most wonderful of all living creatures. Some of them can move as quickly on foot about the land as many of the animals. They swim as lightly as corks in the deepest seas, in the fiercest storms. They dive like fish. To crown all, they fly with an ease and grace and strength which nothing else can match. They find their food where no land animal, no matter how powerful, could live for more than a few moments. No matter into what seas our ships go, there they find some sort of bird giving life and beauty to the scene. The powers of these birds make man feel that Providence, when it made him lord of the earth and the waters, was very mindful of the needs of the inferior creatures. Here we read of some of the most wonderful of these birds.

THE BIRDS OF THE OCEAN

IF we all had to vote for a king of the sea-birds, we should probably agree to crown the albatross. It is not the bravest of the sea-birds. A sea-eagle will readily beat it; so will some of the vicious gulls. But for the perfection of flight, for the beauty of its appearance as it sails the air, and for its unwearying strength, the albatross must have the first place. There are seven species of it, one of them so dull in color that it is commonly called the sooty albatross. The one most generally known is the albatross which, from its great flight, is called the wanderer.

It is about 4 feet long, but its outspread wings measure from 10 feet to 17 feet from tip to tip. They are not great broad wings, like those of the eagle, but narrow, though, of course, very strong. With this great spread of wings the albatross cannot easily get a start on level ground. It likes a rock as a starting-point, unless the wind be blowing. In the latter case the bird faces the wind, and rises against it like a kite.

One day a traveler, walking over an island where many albatrosses were hatching their eggs, found that one bird had dropped into a pit. This pit was 60 feet across, and 30 feet deep, but the bird could not fly out. There was not room enough for its great wings to raise it into the air, and the traveler, climbing down, had no difficulty in catching it and returning it to the high ground, where it could fly. It is in the air

CONTINUED FROM 1566



that the albatross appears at its best. On land, where it is nesting in thousands and thousands, the bird seems as dull as a penguin. But in the air it is a king indeed. A few flaps of its mighty wings send it high into the air over the sea. There it sails like a beautiful ship of feather and muscle. It barely moves its wings at all. It seems to hang in the air, and to float and glide without any effort. Men have watched it for hours and not seen it shift its wings.

Of course, it *does* move them, if ever so slightly; for if it makes the wind carry it, as it is said to do, it must make slight alterations in the position of the wings to enable them to catch the wind and make it carry it in the direction it wishes to follow. But for straightforward flying it is just as much a master. One has been known to follow a swift steamer for hundreds and hundreds of miles, circling in great flights round and round the vessel, on the look-out for any food that might be thrown overboard. The albatross likes live fish, jelly-fish, and other marine creatures; but it is not dainty. It will eat the flesh of a dead whale, or anything too bad to be kept on board a ship. In this way it acts as an ocean scavenger. When it has fed, it swims, dazed, upon the water, and may easily be caught, unless, as often happens when it is pursued, it throws up its food so that it may fly off.

The nearest allies of the stately

albatross are the gulls and the petrels and the auks. Indeed, the albatross is the greatest of all the petrels, although there is one, called the giant petrel, which is not much smaller. The most interesting of these birds of many varieties are the smallest, the little stormy petrels, or Mother Carey's Chickens, as the sailors call them. They are the tiniest of all web-footed birds, being no bigger than large swallows.

The nature of a bird is often told in a common name, and the name "petrel" has a history. Petrel is another form of Peter, and the bird gets this name because it seems to walk upon the water, as Peter the Apostle was permitted to do. No matter how rough the sea or boisterous the gale, there the little bird is to be seen, far out at sea, lightly tripping up and down the waves. It flutters its fine wings only just enough to give its feet the support which they need to keep its light little body afloat. Thus with swift, light feet and fast-flapping wings it skims the waves, greedily feeding upon the little creatures which the stormy waves bring to the top of the water, just before and just after a storm. Those are its most active times, and sailors, noting this, think that the bird causes the bad weather at sea.

THE PETRELS WHOSE HOMES AND HABITS HAVE PUZZLED MEN OF SCIENCE

Even learned men do not know nearly all that there is to be learned about the petrels. It was always supposed that the fork-tailed petrel of Canada never left the vicinity of the Canadian coasts, but suddenly one turned up in England. Another man found the same breed of birds in the Sandwich Islands, and thought that they lived only there; but since then specimens have been received at the British Museum from four different parts of the world. Another petrel variety which was supposed never to leave Fiji has been found in Wales.

The stormy petrel, like the shearwater, another of the same family of birds, may be seen in large flocks far out at sea, enjoying the stormy weather. Most of the petrels skim the waters, but the diver petrels go far down, and dash among the fish which do not come to the surface. The Cape pigeon is really a petrel. Most of the small petrels nest in little burrows, but some lay their

eggs on rocky cliffs, bits of stone serving for a nest. When sitting on its nest, it looks exactly like a chequered homing pigeon, but not when we see that its feet are webbed. The beautiful showy petrel rests on rocky ledges on the sides of dizzy precipices, content with bits of rock and pebbles for a nest.

THE UNPLEASANT WAY IN WHICH THE GIANT PETREL KEEPS OFF ENEMIES

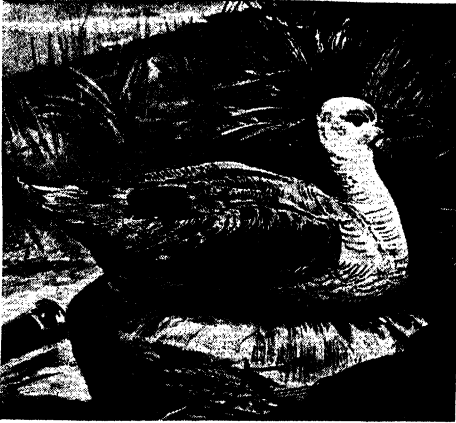
The Antarctic giant petrel, which weighs eight pounds, makes a large nest of stones, and, like the albatross, does an unpleasant thing if attacked. It has the power to withdraw food from its stomach, and to scatter it over the man who goes near. Even the young ones when alarmed can squirt nasty oil from their nostrils to a distance of three or four yards. The giant petrel loves penguin eggs and young penguins, and works havoc among wingless birds.

But the giant petrel is less feared by the penguins than the sheath-bills, which have an uncommon share of the trickery that many of the sea-birds possess. They are not nearly the size of the penguins or the cormorants, being more like large white pigeons, yet they are terrible worries to these large birds. The sheath-bills make their nesting-places in the same rocky, frozen Antarctic islands where the penguins and shags or cormorants make theirs. Now, as the penguins or shags sit upon their nests, a couple of sheath-bills will saunter along, hunting together as wild animals hunt. One of the robbers will walk in front of the nest, and there engage the attention of the sitting bird, causing it to reach forward to attack the sheath-bill nearest her beak, and in so doing, leaving her eggs uncovered at the back. The sheath-bill in the rear will then make a grab at the eggs with its sharp bill. The two robbers then march on, and change places at the next nest, so that both, by taking turns, get their share.

THE PIRATE SKUA, WHICH STEALS THE FOOD OF OTHER BIRDS

A still more audacious foe is the skua. The skuas are a form of gull, and the third largest of the sea-birds. First there is the albatross, which measures 4 feet from beak to tail; next comes the giant petrel, which is 32 inches long and 5½ feet across the wings; then comes the skua, measuring 24 inches and more, and with a splendid stretch of wing. It

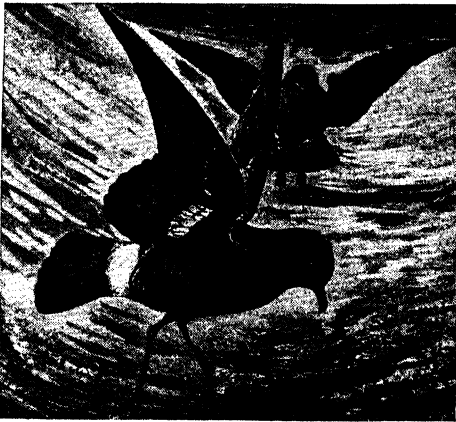
GREAT BIRDS THAT HUNT IN THE SEA



Though a goose-like bird on its nest, the albatross, when flying, is the picture of strength and grace.



Seen on the rocks, the Cape petrel is like a pigeon, but its feet are webbed and it swims like a sea-gull.



When winds lash the seas, tiny sea animals are washed to the surface. The stormy petrel feeds on these, running and flying on the surface of the waves.



Next in size to the albatross comes this giant petrel. Its nostrils form horny tubes on the upper surface of the beak. Its wings measure nearly six feet across.



The sheath-bills are birds to be found on the land in the great, cold Antarctic regions. They are clever, cheeky birds, and cunningly rob other birds' nests.



Skuas are scavengers. They eat decayed flesh, but young penguins and other young birds too. They fight with their webbed feet, which have claws.

is a family of several species, some of which make their nesting-places in the frozen regions, while others are far scattered over the warmer seas. But wherever they are, the same nature rules them. Their proper food is fish, but they eat also the flesh of whales which have been killed; they will eat dead birds and animals; they eat the eggs of other birds, and find young birds quite to their liking.

Seeing that skuas like fish, it might be thought that they would prove expert fishers. But that is not so. They are pirates who rob other birds of their gains. Although their feet are webbed, they have sharp claws, and use these to attack other birds. When a small gull catches a fish, the skua makes a dart at it in the air, and attacks it with such fury that the smaller bird is glad to drop its fish and flee. No sooner does the fish drop from the mouth of the gull, than the skua descends like a hawk, and snaps it up before it can reach the water. Thus, where there are many small gulls and terns on the look-out for fish, there, too, may many skuas be expected, ready to steal the food from their smaller relations.

THE BIRDS THAT EAT DEAD BIRDS, AND THE GULLS THAT FOLLOW THE PLOUGH

They are the scavengers of the penguin rookeries. Many penguins are killed in the course of the year, and their bodies left to become corrupt. Skuas pounce down upon the dead birds and devour their bodies. They help, too, to get rid of the dead bodies of animals on land and in the sea. Flesh and fish are food to them, and nothing else. The effect is, however, to prevent dead bodies of beasts and birds from making the air corrupt. All things die in time; but no matter where death occurs, there is some form of life to consume the remains, unless, indeed, the body be sealed up in ice or mud. It seems a merciful part of the plan of Nature not to have the evidence of death about, and the fierce birds with hearty appetites are but her agents in carrying out part of the work.

Many of the sea-birds are never seen by people who do not make voyages across the ocean. That is not the case with the gulls. Some of these come far inland; though their proper home is the sea, yet they like grubs and worms

and insects that live in the soil. By constant observation they have found out that when the farmer ploughs his land, these things, which form good food for gulls, are turned up. So it is quite common to see a crowd of splendid white gulls gracefully following the plough to pick up the living things which the plough brings to the surface. This, of course, occurs mostly near the sea, or near some big lake; yet gulls dwell far in the interior, as about the prairie lakes of Dakota.

BIRDS THAT MAKE ANIMALS BLIND AND THEN DESTROY THEM

The small gulls are content with a diet of worms, and so forth, but the large ones are as bad as the bad ravens and the eagles. They eat rats and mice, which is just as it should be; but when they kill and eat useful birds, then their visits become unwelcome. Still worse is it when they attack lambs and baby deer. They peck out their victims' eyes, so preventing the poor creatures from seeing a way of escape, and causing them great agony. The large black-backed gull is the worst of the thieves and murderers. This is a bird measuring 28 inches from beak to tail, and that it is very powerful, the fact that it can kill lambs and birds is sufficient evidence.

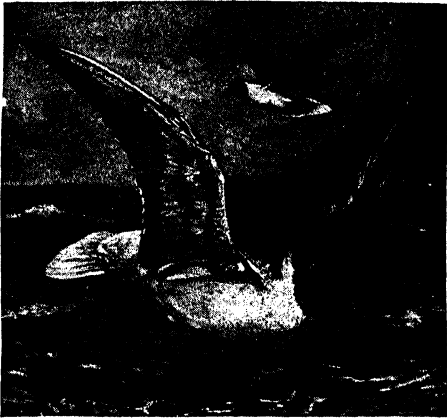
Many gulls have become regular visitors to London. They are to be seen flying along the Thames nearly all the year. They are very tame, and it has become the custom for people on the Thames Embankment to feed the gulls with fish and other forms of food.

The black-backed gulls, the black-headed gulls, the herring gulls, and the kittiwake gulls are all to be seen in winter, at the seaside, haunting the rivers and marshes, or even in the fields far inland, in spring and autumn. Some of them, like the black-headed and black-backed gulls, make their nests among marshes, where they build with rushes and grasses high enough for the nest to be free of water.

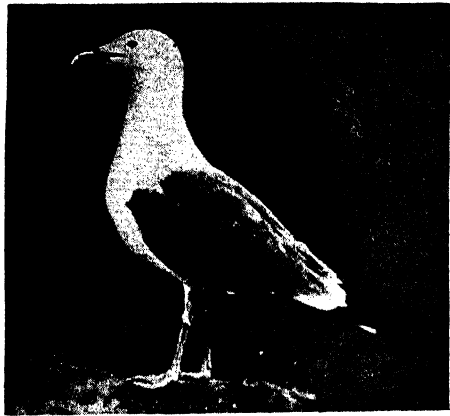
THE GULL WITH A NEST OF SEAWEED, AND THE SEA-SWALLOW

The kittiwake gull, so called because its cry sounds like "kitti-wake," builds its nest of seaweed on tiny ledges of rock high up on cliffs overlooking the sea. The ivory gulls, whose pure white feathers are set off by their jet black eyes, sit

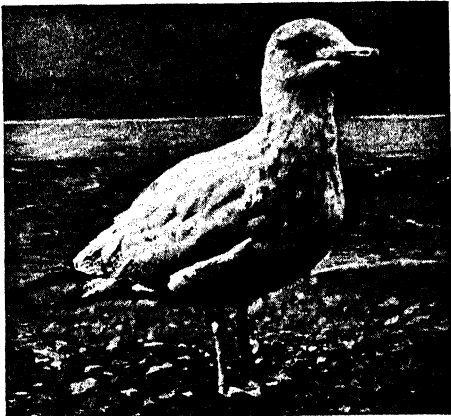
BIRDS THAT CATCH FISH AND KILL LAMBS



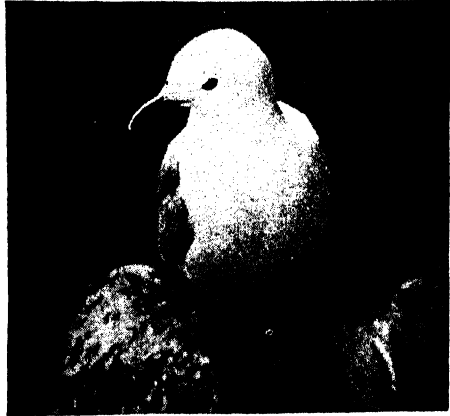
The black-headed gulls are generally to be seen off our coasts. They make their nests in the marshes.



Black-backed gulls like sea-food, but are strong and savage, and kill lambs by pecking out their eyes.



Herring gulls follow shoals of herrings, and, diving into the water, catch them as hawks catch their prey.



The kittiwake gulls spend their days on the sea, and have their nests in the wildest, rockiest places.



The tern is the smallest of the gulls. It flies and darts so swiftly that it is called the sea-swallow. Its forked tail increases its likeness to a swallow.



The black tern is a common bird in some places. In marshes it makes a strong nest of loose vegetation which may float if water rises around it.

The photographs on these pages are by Lewis Medland, W. P. Dando, R. B. Lodge and others.

on their nests and hatch their eggs with snow and ice all around them. One family of gulls we have not yet thought of. That is the tern, or sea-swallow. The name sea-swallow gives us a good idea of its looks. It has a longer, straighter beak than the ordinary gull, and the tail of most species is long and forked, like that of the true swallow. Terns are even more numerous than gulls, and are to be found near the sea in all climates. They fly with the darting speed and skill of the land swallow, but, though as eager as their namesakes to snap up insects, they live chiefly on fish.

HOW THE SEA-SWALLOW'S ENEMY ROBBS IT OF ITS FOOD

As we have noticed the long beak of the tern, the beak of the skimmers may help to keep their peculiarity in mind. Their bills are long, but the lower half is much longer than the upper. The two halves work like a pair of scissors, and the birds are called scissor-bills. When flying low over the water they keep the long lower half of the beak in the water, searching for food in this way as they fly. As the tern is so numerous and such a busy feeder, naturally it has enemies. The most daring is, perhaps, the tropical frigate bird.

This is a bird which flies far out to sea, not to fish, but to rob other birds which have fished. It attacks the terns and gannets, or solan geese, as the skua attacks his victim, and frightens the little sea-swallow or the big gannet into throwing up at least a share of the fish which it has caught. Sometimes the frigate bird has been seen to hide in trees on the cocoa-nut-bearing islands, where many of these birds make their homes, then sail out at night to meet the home-coming wanderers, and make them give up their food. If the gannet proves at all unwilling, the frigate bird takes him by the tail and gives him a good shake, which always has the desired result.

THE HANDSOME TROPIC BIRD WITH IVORY FEATHERS, & THE LITTLE AUKS

A bird in many ways resembling the gull and the frigate bird is the handsome tropic bird, one of the loveliest of sea-birds, with ivory feathers tinged with pink, except at the tips of the wings, where the feathers are black; and around the eyes, where again the feathers

are black. The tropic bird has two elegant streaming feathers in its tail, more like the feathers of a pheasant than those of a bird which passes its life seeking food in the boundless southern ocean.

Sea-gulls are the descendants of the birds from which our field friends the plovers came. The plovers are older than the gulls in the history of creation, and it is pleasant to find both branches of the family flourishing.

When we come to the auks we find a different story. We have the razor-bills, the guillemots, and the funny-billed puffins still prosperous, but the chief of the auks, the famous great auk, is no more. It forgot how to fly, and men killed every member of the race, though the bird once thrived in millions. The other members of the family have kept their wings for flying, and, as they nest far in the North on high sea cliffs, they are safe. In the old days great auks were occasionally found nesting with the razor-bills and guillemots. The smaller birds did not seek such heights then as they do now, or the great auks could not have reached their nesting-places. Birds of different sorts still nest together, while others have nothing in common.

WHY THE GUILLEMOT'S EGG DOES NOT ROLL OVER THE CLIFF

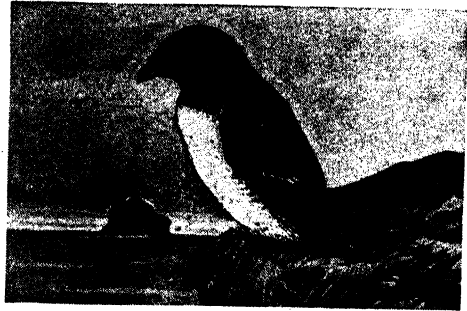
Thus we find one station, or one line of ledges or rocks, occupied by the nests of the guillemots, another by the razor-bills; the puffins take a third distinct series of rocks; the kittiwakes make the fourth part of the colony, while the highest and most difficult rocks of all are occupied by the herring gulls. There seems much confusion when the birds are arriving, and courting, and claiming their nests, but in reality all is in order, and each species of bird keeps together.

Although they live close together, the razor-bill and the guillemot have different methods of nesting. All that the razor-bill does is to find a rock which affords a rough protection for the one egg that it lays. The egg is deposited upon the bare hard rock, but there must be a nook or cranny in the rock to prevent the egg from rolling away and crashing down over the cliff. The guillemot needs not even this scanty guard. So long as the rock is high enough above the heads of men, and far enough from his haunts,

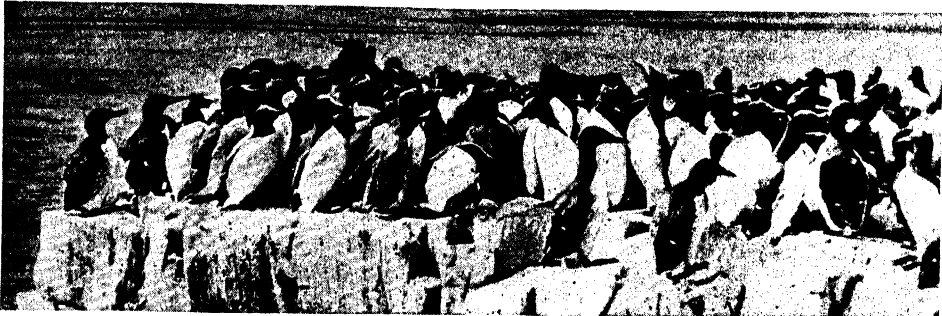
SOME BIRDS THAT CAN FLY AND DIVE



Frigate birds fly beautifully, but they are lazy and rob other birds of the fish they have caught.



The little auks make their nests in the frozen North, but take their little ones, when hatched, to warmer seas.



Guillemots, when grouped together at their nesting-places, look like penguins; but the guillemots fly, penguins do not. They live night and day at sea, but come to land in hosts to lay their eggs and rear their young.



The puffin has a great colored beak, looking far too big for its body. It is called the sea-parrot.



The razor-bills always nest near the guillemots and puffins. In winter they come as far as Long Island.



The great northern diver, when seeking fish for food, can stay under water for eight minutes at a time. Though so alert at sea, the bird walks very badly.



Gannets, when flying, see fish in the sea, and plunge from a great height into the water to catch them. Their bodies have air-sacs to protect them from injury.

the guillemot is satisfied. It deposits its egg on the bare rock high up on a precipice, and there seems no reason whatever why the egg should not roll away and smash.

But there is a very good reason. The egg is long, very broad at one end, and pointed and narrow at the other end. When the egg is disturbed, it does not roll away as a round egg would. It simply rolls round in a little circle. If it were not for this safeguard the guillemots would soon become extinct. Every movement of the bird would be sufficient to send an ordinary-shaped egg to destruction, and there would be no young guillemots.

BIRDS THAT LIVE AT SEA AND COME TO LAND ONLY FOR NESTING

Where we see guillemots we may look for razor-bills. They are related, of course, but in appearance they are different. The razor-bill's beak is not so straight and slender as that of the guillemot, and it has not the cross grooves which that of the razor-bill has. There are guillemots in which the color of the head and back and wings is of smoky brown. Others are black instead of brown. The habits of all are the same. They practically live on the sea, coming to land only for the nesting season, or when they are driven from the sea by the violence of the gales.

They eat fish, particularly young herrings and pilchards, and have so good a life that they are to be seen in countless swarms off our rocky coasts, and at the mouths of great rivers. Farther away there are smaller guillemots. The little auks breed only in the frozen North, and visit the Canadian coasts in the winter. There is a tufted Alaskan auk, which has feathers on its nose like a crest growing the wrong way about— forwards, instead of back over the head. Another little auk has a horn-like knob above the nostrils, possibly to act as a protection.

THE FUNNY LITTLE BIRDS WITH THE BIG BEAKS, AND THE HANDSOME DIVER

These descriptions sound comical, but the birds themselves are not nearly so funny-looking as the puffins, or sea-parrots. These have great horny, colored bills, absurdly large for the small

size of the bird's body. It looks as if Nature had meant to make a great bird, but, after making the beak of one, altered her mind and made the little bird grow on to the end of the beak intended for the big bird. In spite of their funny looks the puffins have quite a good time. They fly, swim, and dive beautifully.

But the most famous of all the diving birds is that called loon, or great northern diver. This is a very handsome bird, measuring almost a yard in length. It is the perfection of grace in the water, and the finest diver in feathers. It can remain under water for eight minutes at a time, then pop down again as soon as it has taken a breath. It flies fast and straight when making for the Arctic regions to nest, yet its legs are so far back that it can hardly walk.

But the champion high diver is the solan goose, or gannet. This is a bird a little larger than the diver, and resembling a graceful goose, with a long and powerful bill. It breeds in swarms upon the sea-cliffs of Newfoundland, and on the Bass Rock in the Firth of Forth, and is rather an enemy to the fishermen. It eats so many herrings that the fishermen say it drives the fish away.

THE AIR-CUSHIONS THAT PROTECT THE GANNET WHEN IT DIVES INTO THE SEA

But, at any rate, the gannets act as a signal to the men. The men watch the gannet flying high in the air. Suddenly they see it dash with amazing speed from aloft right down into the water. The gannet has air-sacs in its chest, which act as a pneumatic cushion, and prevent it from being hurt on making these great dives. There used to be still larger gannets with wings greater even than those of the albatross.

Very few of the sea-birds can be eaten, so fully charged with fishy oil is their flesh. Hence they are not often in the same danger of extinction as the poor penguins, thousands and thousands of which are yearly killed and boiled down for oil. If there were not savage members of the sea-bird family, the number of birds might become possibly too numerous. Nature, however, settles the problem herself. Here, as in every other branch of life, she sets her safeguards against too great an increase.

THE NEXT STORIES OF BIRDS BEGIN ON P. 1753.

The Book of OUR OWN LIFE

WHAT THIS STORY TELLS US

EVERY living thing must breathe, and now we come to study the lungs, the organs of breathing in ourselves and in all the higher animals. The real breathing or burning is done inside the living stuff called protoplasm, but the oxygen it needs is taken in by the lungs. These lie in the chest on a living floor of muscle which moves up and down as we breathe. The air enters the nose—or, when we breathe wrongly or in a hurry, by the mouth—and is there warmed, filtered, and moistened. Then it passes through the voice-box and into the tubes that lead right into the substance of the lungs. So it reaches the air-cells, as they are called, and there it comes near the blood which the heart has pumped to the lungs to meet it. We breathe by sucking in the air, and if we are wise we are careful never to wear any tight clothing over our breathing muscles, but we allow them free play in their ceaseless work of sucking into our lungs the air which our blood must carry to every part of the body for its life.

LIFE AND THE LUNGS

WE have already learned that everything must breathe, and that one of the reasons why the blood circulates in us and in all the other animals that have blood is to carry certain gases to and from the lungs. We have also learned that the real breathing is not in the lungs at all, but in the tissues of the body, where burning goes on. The proper name for breathing is respiration, and real breathing is called internal respiration. We may say a word or two more about it before we consider the lungs and how they should be used.

It has been found that there is a great difference between ordinary burning and the way in which protoplasm or living matter breathes. In ordinary burning, the oxygen just comes to the outside of the coal, or whatever it is that burns, and is then combined with it; but living protoplasm does not burn in this fashion. It takes the oxygen brought to it by the blood right into itself, and probably does many wonderful things with it, producing all the time the changes which are life, before at last it gives the oxygen out, combined with

CONTINUED FROM 1598



carbon to form carbon dioxide gas, CO_2 , and combined with hydrogen to form water, H_2O . Thus we say that the breathing of protoplasm is inside its molecule, and since the word *intra* is Latin for *within*, the proper way of stating this is to say that the breathing, or oxidation, of protoplasm is intra-molecular. It does not matter if you forget the word if you remember the fact. Now let us turn to the lungs.

We have seen that the heart lies in the middle of the chest, and has one lung on each side of it. We must now learn what makes the floor of the chest, for we shall find that this is a living floor, and that, indeed, the lungs cannot be used without its help. It is a flat sheet of muscle stretched right across the middle of the body. There are a few openings in it, through which pass veins and arteries and nerves, but otherwise it is a complete partition between the upper and lower halves of the trunk. It has a rather curious name, which, however, is used for many other purposes; it is *diaphragm*, pronounced *di-a-fragm*, and meaning "across to fence." It is used for anything stretched across.



This picture shows us the position of the lungs and their exact size in relation to the rest of the body.

This diaphragm in our bodies has been described as flat, but really, as the picture on page 1651 shows, it is dome-shaped. It is a living floor, for it is a muscle. When it contracts it becomes more nearly flat, for it presses downwards. This, of course, means that everything beneath it is pressed upon, and as this muscle acts every time we breathe properly, you will notice in yourself that when you take a long breath the lower part of your body bulges forwards. That is because the floor of the chest, which is also the roof of the lower part of the body, has moved downwards and become flatter, so that the abdomen, as the lower part of the trunk is called, has to bulge forwards.

Upon this diaphragm, then, there rest the heart in the middle, and the two lungs. The part of each lung that rests upon it is called its base; it is the widest and broadest part of the lung. If we look at the base of each lung and then follow it upwards, we shall see that it becomes narrower and smaller, until at last it ends almost in a point which actually comes up near the neck behind the collarbone. It is important to remember that the greatest bulk of the lung is its lower part, for there are two ways of breathing—one which fills the upper part of the lung with air and one which fills the lower part; and we see, of course, that it must be better to breathe in the way which fills the biggest and roomiest part of the lung. Now let us begin at the very beginning of the act of breathing, and see where the air goes.

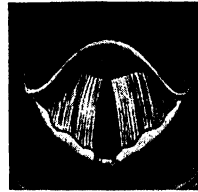
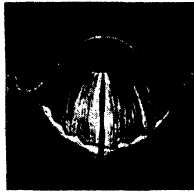
THE CHANNEL THROUGH WHICH THE AIR ENTERS INTO OUR BODIES

There is a perfectly definite channel for the air from the outside world to the lungs, and if we are wise we always breathe by this channel. The opening of it is the nose. Now, this is very important, for it so happens that we, unlike some animals, can also breathe through our mouths, and though there is no objection to doing this sometimes, we should know that the mouth is the

opening of the canal that has to do with food, whilst the nose is the opening of the canal that has to do with air. Each opening is provided with suitable arrangements for its special purpose. The mouth contains teeth and all the arrangements for tasting; the nose contains little hairs for filtering the air; it contains all the arrangements for smelling, and, as we have seen, it has a wonderful loose lining which can be flooded with blood so as to warm the air before it enters our lungs.

THE WAY IN WHICH THE AIR IS FILTERED AS IT COMES INTO OUR LUNGS

But this is not all. If we trace out the passage of the air through the nose, we find that, instead of being straight and open, it is extraordinarily twisted and roundabout. You would not think that this was an advantage, but it is a great advantage. For one thing, it compels the air to pass over a great surface



These pictures show us what the glottis, or voice-box, looks like. The vocal cords, shown in white, tighten to close the box more, and loosen to open it. When the box is almost closed the pitch of our voice is high; when it is opened wider our voice is lower.

which has warm blood underneath it, so that the air is warmed, and it means, also, that a good deal of water vapor—that is to say, water in the form of gas—can be added to the air if it does not already contain enough.

That is good, for perfectly dry air is very irritating to our lungs, and dries them up in a very unhealthy way. Lastly, this long, twisted, in-and-out passage for the air makes a splendid filter. A very large quantity of all the dirt in the air, and of any microbes that may be in it, is stopped by this filter, so that the air which is allowed to pass on to the lungs is not only nicely warmed and moistened, but is greatly purified. Experiments have been made which show that when, by means of a tube passed into the mouth, we withdraw the air which has been through the nose filter and is on its way to the lungs, no microbes can be found in it—though it may have had hosts of microbes in it when it entered the nose.

It follows, then, that it is the duty of every one of us to breathe through the nose. Now, the passage of air is easier through the mouth than through the nose, just because the mouth does not trouble to filter it; hence, if you keep

your mouth open, air is sure to enter through it when you breathe. The rule, then, must be to keep the mouth shut. It should be opened when we have something to swallow, and it should be opened when we have something to say. In this latter case air passes through the mouth, but it is passing not inwards but outwards.

A MOST IMPORTANT THING IN LIFE IS TO BREATHE THROUGH THE NOSE

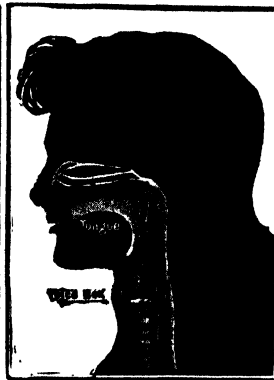
There are few more important lessons for health than this lesson that we should breathe through the nose, and not through the mouth, as a rule. Every child should be taught this lesson, and the way to learn it is to learn to keep the mouth shut. It does not take long before this becomes a habit which we soon cease to notice and need not think about again. All over America there are unfortunate children whom their school-teachers think stupid, who are not as tall and heavy as they should be for their age, who suffer from frequent colds and sore throats, and so on, simply because they have something the matter with their noses, which can easily be put right, but which, if it is not put right, prevents them from breathing properly through their noses as everyone should, and so goes far to spoil their lives. I do not think there is anything in this book more important than this rule that, we should breathe through the nose.

After passing through the nose filter, the air streams into the throat at the back of the mouth, and passes into the voice-box, the front of which you can feel in your neck. This voice-box has two folds of tissue stretched across it from each side, with a tiny chink between them. Every time we breathe in air, the brain sends an order through certain nerves to the muscles which

govern these little folds, or vocal cords, as they are called, and they swing widely apart, so as to leave a large space through which the air can pass without making any sound.

We all know what a choking fit is. What happens then is that something or other which has got into the voice-box has thrown this beautiful arrangement out of order, and the vocal cords, instead of separating to let us breathe, are thrown together so that the air can scarcely force its way between them. In doing this it sets them trembling or vibrating—just as it ought to do on its way out when we speak or sing—and so makes those horrible little noises which we all make at these times.

But though we feel very miserable



These diagrams show the positions of the passages through which air and food enter our bodies. The air enters through the nose, and is purified in the three white passages, then passing down to the glottis and on to the lungs. The left picture shows what happens when we choke. The epiglottis, the little trapdoor which drops and closes the windpipe when we swallow, has not been quick enough, and a piece of food has been caught.

during a choking fit, we need not be afraid, for as soon as the brain finds it is getting too little oxygen in the blood brought to it, it *always* orders the vocal cords to relax, and in a moment we find that we can take a long, deep breath quite easily. Ofcourse, this cannot save us in the rare cases where a lump of food or something has got actually stuck in the top of the voice-box, so that the air cannot get past it. This is the only serious kind of choking. I have called it rare, and it is rare compared with ordinary choking fits, but it really happens often, and kills many people.

HOW WE MAY SAVE OURSELVES IN A CHOKING FIT

If we have all learned at school the simple things which really matter, and cannot be forgotten, no one need ever be killed in this way, so long as anyone else is present. Indeed, one could save oneself. The top of the voice-box is so near to the mouth, after all, that anyone can be saved by a forefinger quickly and boldly passed into the mouth so as to remove the obstacle. This needs

no skill, but only courage, and anyone who knows it may, in such a case, save the life that is dearest in the world to him or her.

Of course, little specks of food often find their way, as they should not, into the voice-box, but the result of that is to make us cough violently, which means sending up a great blast of air from the lungs, and that blows the obstacle away. It is very small babies and very old people who are most apt to be choked, for they cannot cough strongly. Also there is a terrible kind of sore throat called diphtheria, in which something is apt to form that blocks up the opening of the voice-box, and used to choke many children; but there has been found a wonderful medicine which really cures this disease. When it is used in time it probably never fails.

It is a curious thing about the body, that, of the two passages in the throat, one for the air and one for the food, the food passage lies behind. This means, of course, that everything we swallow has to be made to jump across the opening into the lungs through the voice-box. We find this very easy, because the act of swallowing is such a wonderful one, little though most of us think about it. It depends upon the beautifully balanced use of scores of nerves and muscles. If we laugh or try to talk just when we are swallowing, of course we throw this beautiful machinery out of order, and instead of everything passing safely over the opening that leads to the lungs, some of it is apt to get in.

THE TWO TUBES THROUGH WHICH OUR BREATH GOES TO THE LUNGS

After passing through the voice-box, the air flows down the windpipe. This is a large round tube which you can readily feel for yourself in your own neck. Just below the big part of the voice-box there is a sort of ring, easily felt, which is really part of the voice-box itself, and below that you can feel the round tube running away down into the chest. If you feel carefully with the tip of your finger, you will find that this round tube is made of a number of little rings. This we usually call the

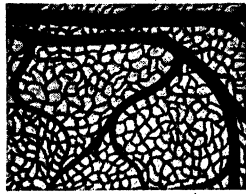
windpipe, and its special name does not matter. After it has passed down some distance, it divides into two tubes, one going to the right lung and the other to the left. Each of these in the substance of the lungs divides up again and again like a tree. These tubes are called the *bronchi*, a name which we can all remember, as when they fall ill we call the trouble bronchitis. As they subdivide, of course the branches get smaller and smaller, until at last they become quite tiny, and then we find that they end in a countless number of little buds, as we might call them, which are known as the air-cells.

HOW THE LUNG IS WONDERFULLY MADE WITH A SURFACE OF 2,000 FEET

These are not what we have learned to understand by the word cells, but little hollow spaces lined with living cells and containing air. Thus a little bit of tissue from the lung will float, unlike any other tissue of the body, for from the first breath that a baby draws, the lungs become filled with air, which never wholly leaves it. The air-cells are lined with smooth, flat, living cells, through which the gases have to pass as we breathe. They are exceedingly thin, and immediately underneath them runs a rich supply of tubes containing the blood which is to be purified. This means, then, that the gases have to pass through two layers of cells—the layer that lines the “air-cell,” and the layer that forms the wall of the capillary or tube.

The structure of the lung is beautifully adapted for its purpose. Men have tried to measure the extent of surface where the blood is exposed to the air in the lungs, and they say that, in consequence of the way in which the lung is made, this surface would actually measure, if it were stretched out, 2,000 square feet. Of course, it is evident that if the lung were simply a big hollow space it would only have two or three square feet of surface, but as it is made rather like a sponge, the surface of it is increased to this enormous extent so that there is space enough for the blood to be purified.

If we could see the lung of a new-born baby, we should find it pearly white in color, but tinted with pink by the blood;



This is what our lungs are made of—what we should see if they were cut through. The broad dark tubes are veins and arteries, and the little ones are capillaries.

if there were no blood in it, it would be perfectly white. The lung of an Esquimau, if he has never breathed coal-dust and smuts, is the same color as that of a new-born baby; the lung of a coal-miner is quite black, owing to the large quantity of black coal-dust that he has been breathing. His nose cannot keep out everything, and all the particles it fails to keep back, which get into the lung, stay there, except that a few of them are picked up by the white blood-cells, and may be coughed up and so got rid of. The lung of an ordinary city-dweller is slaty grey—about half as dirty as the coal-miner's.

THE LIVING OARS OF THE LUNGS THAT DRIVE THE DUST BACK

It is one of the most important duties of the lung to keep itself free, as far as possible, from any foreign matter; the air-passages must be kept clear and open and without obstruction. There is a beautiful arrangement that helps this. If we look through the microscope at the cells which line the windpipe, and the bronchi, almost down to where they end in the air-cells, we find that they are lined with cells of a particular kind. These have a number of tiny little things like living oars sticking out from them; they look rather like eyelashes, and so are called after the Latin word for eyelashes, which is *cilia*.

All these living oars, or cilia, lash in the same direction, and that is upwards. They do their best, then, to push upwards as much as they can of the dust and dirt we breathe, and then, when we cough, we get rid of these. But the lung of the coal-miner and the lung of the city-dweller prove that, in spite of the nose filter, and the white cells, and the power to cough, and the cilia of the cells that line the windpipe and bronchi, it is still impossible for the lung to keep itself clean if, day after day, we breathe the dirt with which the air of cities is

filled. A great feature of the tissue of the lung is that it is elastic. This is due to the fact that it contains a great quantity of the special kind of tissue which we find in the body wherever elasticity is wanted. This tissue looks yellow under the microscope, and is made up of tiny threads which can be seen to curl up if they are loosened out. The lung is rich in this elastic tissue, and this is most important, since it has a great deal to do with the act of breathing. We are going to talk about that in a moment, but here I may say that the act of breathing out costs us in health no trouble or effort at all, since it very largely depends upon the elastic recoil of the stretched lung itself.

A grown-up man breathes about fifteen or sixteen times in a minute; a woman

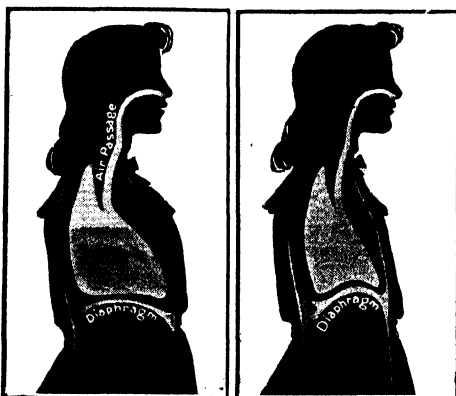
perhaps eighteen times in a minute. Children breathe much more often than this. Breathing has two parts—breathing in and breathing out. The first is called inspiration, and the second expiration, and now we must learn how these acts are performed.

The muscles of breathing are very numerous; indeed, in what is called forced breathing almost every muscle of the trunk is used, but in ordinary breathing we use simply the

diaphragm and the thin muscles between the ribs. Much the most important of these is the diaphragm, and it is important to give the diaphragm free play in breathing. If we wear tight clothes round the waist, the diaphragm is interfered with, and we can only breathe by using the ribs.

WHY IT IS HARMFUL TO WEAR OUR CLOTHES TOO TIGHT

Until lately this deceived the students of the body, who used to say that boys and girls and men breathe mainly by the diaphragm, but that women breathe mainly by the ribs. We know now that that is quite untrue. Everyone who is



Here we see what happens when we breathe. When we breathe in, the diaphragm lowers, the ribs rise and move forward, thus making room for the lungs to expand as pure air rushes into them through the windpipe. This is shown in the left picture. When we breathe out, the diaphragm goes back to its arched shape again, and the ribs are lowered, while the poisonous gases from the blood are driven out.

properly dressed breathes mainly by the diaphragm. It is only because many women wear their clothes too tight that the movement of the diaphragm is interfered with, and so they have to breathe by their ribs.

When we breathe, then, an order is sent to the diaphragm from the brain, and it becomes flattened. This acts like what is called a suction pump. The amount of room in the chest is increased, and the air from the outside is sucked in.

THE TWO MUSCLES THAT MUST BE ALWAYS MOVING IF WE ARE TO LIVE

We have already seen that, at the same moment, the brain, which governs the whole process, sends an order down to the voice-box, so that a wide opening is made there between the vocal cords for the air to pass through. Inspiration, then, is a muscular act, requiring effort, and the muscles which perform it must go on acting if we are to live. A person may lie in bed all his life, and may never even move himself in bed. The muscles of his neck and arms and legs and trunk may all lie unemployed for years, but there are at least two muscles which must be in action if any of us is to live; they are the heart and the diaphragm.

Expiration, or breathing out, is quite different. Except when we cough or sneeze, or speak or sing, or when there is some obstruction in the air-passages, expiration costs no effort at all, and no muscles are employed. What happens is simply elastic recoil—the recoil of the stretched lung and the recoil of the wall of the abdomen, which, as you know, bulges forward when we breathe. So, without any effort, the air is forced out of the lung, and a new breath is taken in.

THE SMALL SPOT IN THE BRAIN WHICH IS THE CENTRE OF OUR LIFE

The whole of this wonderful process is entirely governed by a small spot in the brain, which we call the breathing centre. It lies quite near the centres that govern the heart and blood-vessels. The old name which was given to this centre when it first was found was the *vital point*, because in a sense it is the centre of our life. If anything destroys it, we must die. Certain poisons act upon it, such as the poison in opium; too large a dose of either opium or alcohol kills in this way by paralysing the breathing centre. We know now

how this wonderful centre works, and how it can modify our breathing. The nerve-cells that make it up are nourished by the blood, and they are very sensitive to the quality of the blood that reaches them. Especially are they sensitive to the presence of too much carbon dioxide in the blood. Nothing else excites them so much. Directly this happens they send powerful orders to the breathing muscles to breathe deeply and quickly, and get rid of the excess of this poison.

Now, since these nerve-cells act entirely in accord with the quality of the blood, there is a way of getting them to rest for a time, and this is known by everyone who performs diving feats. Boys often try to see how many plates they can pick off the floor of a swimming bath. Now, the way to stay under water as long as possible is to take a number of quick, long, deep breaths for a little while just before you dive in. By this means you can get rid of a great deal of the carbon dioxide in your blood, and you can stay under water quite a long time, until at last so much fresh carbon dioxide has passed into your blood from the tissues that your breathing centre will rest no longer, and you *must* breathe.

WHAT TO DO WHEN YOU COUGH THE WRONG WAY

We have already read something about sneezing, which is a particular kind of expiration, in the BOOK OF WONDER, on page 814. Speaking, singing, and coughing are all special kinds of expiration, too. Hiccough, on the other hand, is a special kind of inspiration. If you notice yourself next time you hiccough, you will see that it is just the opposite of coughing. In coughing you breathe out, in hiccoughing you breathe in. Hiccough is due to something disturbing the diaphragm; usually something in the stomach. If it can be stopped at all, there is one way of doing so which is much better than any other. What you should do is to breathe out as far as you can, and hold your breath there until you feel bound to breathe in again. Doing this three or four times will stop the hiccoughing, if it is to be stopped at all, for it means that you are deliberately ordering your diaphragm not to contract, but are making it rest, and usually it will behave after you do this.

THE NEXT PART OF THIS IS ON PAGE 1803

WHY DOES A SLATE PENCIL WRITE?

THE kind of pencil that we use to write on slate writes simply because the slate is hard enough to rub it down when it is pressed. Paper is not hard enough to do this; if we press very hard we only tear the paper. We not only require hardness, but also a certain degree of roughness, to enable us to write. Neither an ordinary pencil nor a slate pencil will write on glass, because the glass is so smooth that there is not friction enough to rub off the tip of the pencil as we move it.

WHY WILL A PEN AND INK WRITE ON PAPER BETTER THAN ON A SLATE?

The principle of writing with a pen and ink is quite different from that of writing with a pencil, because here we are using a fluid, and what we want is a surface which will readily absorb a small quantity of the fluid as we write, but not too much of it; and writing-paper does this very well, though blotting-paper is too highly absorbent, and so does not allow us to write clearly. But a slate and a surface of glass are not absorbent at all, and, as a rule, the ink runs very slowly from the pen because there is nothing to draw it, and it is held by the pen almost as well as if we were just hanging the pen in the air. But paper, being absorbent, is full of tiny pores, and these draw the ink out of the pen in just the same way as a sponge will suck water.

WHY IS THE AIR ALWAYS SO HOT BEFORE THUNDER?

As a matter of fact, the air is not always hot before thunder, but it almost always has a way of *feeling* hot, and the whole point lies in the difference between these two things. We judge of the warmth of what is around us by the warmth of our skin,

CONTINUED FROM 1592

in which lie the sensitive ends of the nerves that tell us of heat and cold. And the reason why we always think it so hot before thunder is that our skins are so very apt to become hot at such times.

Before a thunderstorm the air is almost loaded with moisture. Now, this means, naturally enough, that it is very slow to take up any more moisture, and our skins, which are always producing water—for we perspire all the time, whether we notice it or not—find that they cannot get rid of it to the air as quickly as usual, and we say: "How muggy and close it is!"

Now, one of the great means by which the skin and the body are kept cool, though we are always producing so much heat in ourselves, is by the evaporation into the air of the water from our skins. If this process is slowed, the skin grows uncomfortably hot.

After the storm, when the water has mostly fallen out of the air, the atmosphere can readily hold what the skin desires to part with, and then we say: "How delightfully fresh it is!"

HOW CAN WE JUDGE DISTANCE?

Mainly we judge by experience. For instance, a square box, as seen by us, is made up of lines running at various angles. This is true when we look at it, and a picture of it simply copies the direction of these lines. If we did not know that that was what a square box looked like, we could not tell its shape. A small child, who has no experience, is quite unable to tell.

A very young child, just beginning to observe, cannot tell distance, either in a picture or in a real thing, because it has not yet learned that lines running in certain directions

mean this or that shape for the thing we are looking at. People who have been blind all their lives are similarly puzzled if their sight returns to them. It was long ago pointed out by observers of the mind that after the very beginning of our lives we never get a pure sensation of vision, whatever we look at, because we are always influenced by memory and experience, and so the eye contributes something of its own to what we see. Whenever we see distance in a picture or a real scene, the eye has made its contribution in this way.

HOW IS IT THAT WE SEE DISTANCE IN A PICTURE ?

A picture or a photograph gives us the effect of depth and distance, and what is called perspective, in exactly the same way as our eyes do in ordinary seeing. When we see anything, a photograph—that is, a light picture—is printed on the retina of the eye. It is printed on the flat, just as if it were on a photographic plate, yet we interpret this flat picture to mean something that has depth and distance.

If it is a picture we are looking at, *its* photograph on the retina is no flatter than it would be if we were looking at the real thing. Thus, in every case, the brain has to make sense, so to speak, of a flat photograph printed on the retina.

In some measure it does so by help of the fact that we have two eyes, seeing at slightly different angles. Thus one eye sees farther round one side of anything than the other does, and the other eye sees farther round the other side, and so we are helped to get the idea of depth.

When we look at an ordinary picture, however, we do not have this advantage, and yet we get the effect of distance, just as we do when we look at a landscape with one eye only. So, plainly, having two eyes is not the whole explanation, or even most of it.

WHY CAN WE SEE SO MUCH OUT OF ONE SMALL WINDOW ?

If we look at anyone's eye, we see in the middle of the colored part of it a small black spot, called the pupil. Now, there is no denying that this spot is a window, and a very tiny one indeed ; yet through it a man can gaze upon a great part of the face of the boundless sky. Therefore this question about looking

out of a small window might have been meant to refer to the pupil of the eye as well as to the window of a house.

Let us take the case of looking at the sky at night through a window ; in any case it must be through the tiny window of the eye. In many directions we see the stars, and the distance between them is enormous. This can only mean that the rays of light travel straight from each star to the eye, and enter it from various directions at once.

So long as the rays do not come in too slantingly to strike the retina—the curtain at the back of the eye—we shall see the stars at once. Of course, the size of the pupil, or the window, makes a difference, for if it is small, many rays coming at a big angle will be cut off.

WHY CANNOT WE WALK STRAIGHT WHEN WE SHUT OUR EYES ?

It is really not very surprising that we cannot walk straight when we shut our eyes ; it would be more surprising if we could. There is only one way in which we could possibly walk straight with our eyes shut, and that would be if the strides taken by our two legs were always equal. In that case we could walk straight with our eyes shut.

But, though we may not think it, our strides are not the same length, and this is probably true of everyone, without exception. Our legs are, as a rule, very nearly the same length, but if we measure them very carefully, we shall find that they are never quite exactly the same length. So, in point of fact, everyone takes rather a longer stride with one leg than with the other, and so, if we are left to ourselves, without any guidance at all, we walk in more or less large circles.

But when we find we cannot walk straight, even for a few paces, with our eyes shut, the reason is not in our stride at all, but in the difficulty of balancing. Our eyes are of the greatest importance in helping us to balance our bodies, and without them the weight of our bodies is apt to go too far on one side or the other, and then we have to take a step accordingly to save ourselves from falling, and thus we lose the straightness of our course.

WHEN WE ARE LOOKING AT A RAINBOW, CAN OTHER PEOPLE SEE THE OTHER SIDE ?

This is a very natural question to ask, and, of course, the whole answer

THE BOOK OF WONDER

to it depends on what a rainbow really is. If it is anything at all like what it appears to be, there is no reason why, when we are looking at one side of it, other people should not be looking at the other side—just as if it were, say, the arch of a railway bridge. But it is absolutely impossible that anyone can be seeing the other side of the rainbow that we see.

What we call the rainbow is made by the reflection of sunlight from drops of water in the sky. Therefore, to begin with, the rainbow can only appear to us on the opposite side of us to the sun. Anyone trying to look at the other side of the rainbow would be looking towards the sun, where, owing to the very nature of a rainbow, one can never be seen. Now, if a rainbow is formed by the reflection of light from drops of water suspended in the sky, that are so placed as to have our eyes between them and the sun, plainly there can be no other side to the rainbow.

WHY DO OUR VOICES SOUND HOLLOW IN AN EMPTY HALL?

We can almost guess the right answer to this question for ourselves if we begin by asking ourselves why we use the word "hollow" to express the sound of our voices in such a case as this. The truth is that this is the kind of sound that is produced within any hollow or more or less rounded space, and, by a rather absurd use of language, we call the kind of sound produced in a hollow space a hollow sound.

Now, we must ask what it is that gives this character to the sound. It is that the sound is reflected back from the sides of the space where it finds itself, and it is this echoed quality that distinguishes it.

Exactly the same thing makes the difference between our voices on the level in the open air and in an empty room or hall. The reason why furniture and people and hangings help so much to deaden the sound in a room is that these things either have very irregular surfaces, which break up the sound waves and do not reflect them truly, or else they are made of materials which are soft and not elastic, and therefore simply absorb the sound and deaden it.

WHY DOES MY VOICE SEEM LOUDER WHEN I PUT MY HANDS OVER MY EARS?

We can help ourselves to answer this question if we consider the case of a sea-shell held over the ear. There is no

sound made in the shell, but it picks up all the tiny sounds that are made in the room, and echoes them to the ear. Our hands held over our ears act in exactly the same way. They echo the sounds just as the shell does.

But it is true that the special case where the voice is our own is rather different from other cases. Perhaps we are rather apt to think of sound as something that always flies "forward" from the place where it is made. But, just like the light of a candle, sound flies out equally in all directions, except in so far as special causes direct the waves or echo them.

So the sound made by our voices travels round beside our ears, and is caught and echoed into them by our hands. Not only do our voices sound louder, but they also sound very strange to us. This is because we usually hear our voices partly through the air waves coming against our ears, and partly by sound waves traveling through the head to the ears from the voice-box. Anything that alters the proportion of these two seems to change the voice.

WHY DO OUR HANDS BECOME WARM AFTER PLAYING WITH SNOW?

It is very wonderful that our hands should become warm after playing with snow, for it must be perfectly certain that the cold snow takes heat away very quickly from our warm hands.

The warmth of our hands is derived entirely from the blood, except at times when something hot is actually giving them heat. Therefore, for some reason or other, a very much larger amount of blood than usual must be flowing through our hands. The blood is no warmer in itself, or the whole of the body would at once notice it, but what really happens is that the hands are getting a much larger and quicker supply of it.

The effect is just the same, really, as the delightful glow that we feel after a sea-bath. The brain has the duty of taking care of the skin, as of every other part of the body. Now, when the skin has been chilled, its life has been heavily taxed, and it will suffer unless it is compensated. So the brain orders the small blood-vessels in the skin, wherever it has been chilled, to relax and widen so that the warm blood is able to circulate quickly through them.

ARE THERE MORE PEOPLE COMING INTO THE WORLD THAN GOING OUT OF IT?

Certainly there are. There were never so many human beings in the world as there are to-day, and there will be more to-morrow. Every new power that men learn how to use, every machine and invention, all new knowledge about plants and animals, and the forces of Nature, mean, in the long run, that we are making the earth a place capable of supporting more of us. No one knows how rapidly the population increases in China and many other parts of Asia; but in Europe the facts are fairly well known.

Every year there are nearly half a million more people in the British Isles than the year before. The Germans add two babies to their population for England's one. This reckoning is not made on the birth-rate, but on the difference between the birth-rate and death-rate, which is what this question asks about.

In France the birth-rate and death-rate, though varying to and fro in the last few years, are about equal; but in Russia, where families are the largest in Europe, the number of people increases every year to the extent of about two and a quarter millions.

In the United States the population increases very rapidly, for here it is increased not only by the fact that more babies are born than people die every year, but also because many people come over every year from Europe and, also, to an increasing extent, from Asia.

WILL THE WORLD'S FOOD SUPPLY EVER RUN SHORT?

It is quite plain and certain that, as people cannot live without enough food, there never will be more people than there is food for them to eat. But it is true, in a sense, that there is not enough food for all the babies that are born. The struggle for life is, in the first place, a struggle for food, and for a large number of people all over the world the struggle is so severe that many babies and children are killed by it, directly or indirectly.

But, as we read in the previous answer, the number of people in the world steadily increases, and doubtless always has increased since mankind came to be, except for short periods during some terrible war or pestilence. And steadily the amount of food has been increased

by human effort. Men learnt how to tame and care for sheep and oxen and goats, and so obtained flesh and milk. This pastoral stage—pastoral comes from the word pastor, which means a shepherd—yielded to the agricultural stage of growing crops, which supports far more human life than the pastoral stage alone can.

It is certain that some day there must be a limit, though, even with sixteen hundred millions of people on the earth, we are nowhere near it yet. When freed from the insects that carry disease, Africa alone will be capable of holding and feeding five hundred million people more than it does now.

OF WHAT IS MIST MADE?

Mist is made of water, as anyone can tell who has been out in it and has felt it cling to his hair and his clothes. But there are many and various ways, besides mist, in which water is found in the air, and one of the very questions which men of science are now doing their best to answer is the question why the water in the air should sometimes form cloud, sometimes mist, sometimes rain, and sometimes be found entirely as water-vapor, quite invisible and simply forming one of the gases of the air.

We are now beginning to learn that, if water is to be in the air in any form except the last, it must have something to cling round. This is true of rain-drops or mist or cloud. Probably the differences in these cases are due to variations in the kind of thing that the water clings to and condenses round.

Often these *nuclei*, as they are called, are particles of dust, large or small, but sometimes it seems that the very molecules of the other gases of the air are apt to get broken up by electrical power, and the broken parts of these molecules act as centres for the water-vapor to cling to and gather round.

HOW CAN THE EARTH REFLECT LIGHT WHEN ITS SURFACE IS DULL?

But is the surface of the earth dull? Surely not. The very fact that we can see it at all shows that it is reflecting light to our eyes, and very often the surface of the earth looks exceedingly bright; so also very often does the surface of the sea, and we all know how beautifully bright the light side of the clouds may appear.

THE NEXT QUESTIONS BEGIN ON PAGE 1787.

The Book of FAMILIAR THINGS

THE WORLD'S FLAGS IN COLOR

THE flags of the principal nations of the world are shown on another page in their proper colors, or almost their proper colors, for no ink is made which will represent exactly the colors in some of them. Since the beginning of the Great War some of these flags have become better known to us than formerly. Once it was unusual to see the flag of a foreign country displayed. Many nations have more than one flag. Generally there is a national or royal flag and often there are naval and trading flags for merchant ships in addition. For example, the Union Jack is the national flag of Great Britain, but the king has another flag, and the Navy uses a white flag which a great red cross divides into quarters, and the Union Jack fills one of these quarters. The German flag shown is the naval flag, while the merchant flag is simply the upper left hand corner without the cross. The Japanese flag shown is the naval flag, while the merchant flag shows only the red sun without rays on a white ground. There is an imperial flag besides.

THE FLAGS OF ALL NATIONS

SOMEWHERE in his pockets a man carries a case containing cards bearing his name and address. If he wishes to be known, he presents one of his cards to the person whom he meets. That will make him known to anybody who can read. But years and years ago that card would not have served this purpose. Great lords and ladies could not read. They wanted signs, just as little children do to-day. When knights rode forth to battle, they wore cloaks over their armor, or carried pennons upon their lances, bearing their devices.

Nations are recognized by their flags just as the knights of old used to be. To carry a sign as a means of identification is a very old idea. The Israelites had their sacred standards; the Egyptians had their fan-like arrangement of feathers, borne on the top of spears, showing pictures of their gods and sacred animals. It was necessary that these signs should be borne, so that troops in battle would recognize the flag of their friends, and rally to it instead of fighting or running away.

When England first became a strong military power, her soldiers went forth to battle under many flags. Each great nobleman who kept a fighting force had his own standard, and there were as many battle-flags as noblemen in the armies, but in the time of Richard Cœur-de-Lion was the beginning of what is now the

CONTINUED FROM 1547

Royal Standard. It is known that he used the three lions for the national flag, for there exists his great seal with the three lions, like those of the flag, upon it. As time went on and the British kings conquered other peoples, or married queens from other royal families, signs were added to the flag. For a long time England laid claim to France. Her rulers called themselves kings of France as well as of England, and the national flag bore upon it the badge of France until 1801. There were also the arms of Hanover in the middle of the Standard. There were many changes in it before it took the present form.

Now the Royal Standard is divided into four quarters, and represents the arms of Great Britain and Ireland. In the first quarter are the three British lions of England. In the second quarter the angry-looking fighting lion of Scotland. In the third quarter the harp of Ireland, and in the fourth quarter the lions of England are repeated. Wales does not appear as a separate country on the flags. She is so much a part of England. The arms of Ireland were on the flag long before the union of Ireland with England, because Ireland had been conquered by England, but it was not until 1801 that the union between the two countries took place. The arms of Scotland were placed on the Royal Standard when James VI. of Scotland became

James I. of England. The Royal Standard is really the king's flag. It can be flown only where he is living and at a few fortresses.

When the American colonies were subject to Great Britain they used the British flag. After they began to revolt a number of different flags were used in different colonies. One had a rattlesnake with the motto "Don't Tread on Me"; another much used had a pine tree.

Congress, in June 1777, decided upon a flag of thirteen stripes, seven red and six white, with thirteen white stars upon a blue ground, to indicate that the Union was composed of thirteen states. Some think the idea came from the coat of arms of the Washington family, which shows white and red stripes and stars. Mrs. Betsy Ross, of Philadelphia, is said to have made the first flag, and the first time one was used in battle was at Oriskany or Fort Stanwix, August 6 the same year.

When Vermont and Kentucky, the first two new states, were admitted to the Union, both stars and stripes were increased to fifteen, but when other states were admitted, it was seen that the stripes could not be increased. So the number of stripes was reduced to thirteen, in honor of the thirteen colonies, but a star has been added for each new state. The number, since Arizona and New Mexico have been admitted, is forty-eight.

The German nation consisted, until 1870, of many kingdoms and other little states. Then the countries united and made the King of Prussia the German Emperor. They had then to create a national flag. In this, as in the German Imperial Standard, the Prussian eagle and colors of black and white figure largely. That is because Prussia is the largest and most important kingdom in Germany, and the black eagle has for 500 years been the emblem of the Hohenzollerns, the royal family of Prussia.

One flag of Austria-Hungary has a patch of green in the bottom corner. The reason is this: The Austrians are one nation, the Hungarians are another. One sovereign, the Emperor of Austria, rules both countries, but he is crowned a second time as King of Hungary. And to show that they are two countries, we have the colors of Austria and the patch of green for Hungary, declaring that the flag of the two nations have been placed

together and made into one to represent the two peoples as one united nation. The Imperial Standard is shown here. The Russian Imperial Standard is a two-headed eagle upon a yellow ground. This comes from the arms of the Greek Empire, the Tsar Ivan III. marrying, in 1472, a daughter of the ruler of the Greek Empire, and adopting her arms. Other Russian flags represent St. Andrew, who is said to have taken Christianity to Russia, and St. George.

France, like England, has the red, white and blue for her banner. In olden times she had the fleur-de-lys. What that really was we do not know. Some say it was a lily; others say it was an iris; while others believe that it was the head of a lance. It was no longer used after the people of France turned their king off the throne and had Napoleon for their emperor. He had the eagle for his war emblem, but the simple red, white and blue banner is to-day, as it has been for over a century, the national banner of France.

The Spanish Royal Standard tells stories. It bears the arms of countries which it no longer owns. It shows the arms of Austria, of parts of France, of Sicily, of Portugal, and of parts of Belgium. All these places were once owned by Spain, and she retains the colors in her flag as if they still were hers. The flag which has been longest unchanged is that of Denmark. The Danish king, 700 years ago, said he saw a cross in the sky when fighting against the heathen, and as he was victorious adopted the cross for his banner.

One of the youngest of important national flags is that of Italy. The might and majesty of Rome passed away, and the country became split up into little states, some ruled by the Pope, some by Austria, some by petty kings. Victor Emmanuel, aided by Garibaldi and other bold volunteers, rid the country of its enemies, and made the Italians one nation. He was made king, and gave the country the flag of united Italy.

Greece, which gave to mankind Alexander the Great, conqueror of the world, fell, in later days, under the rule of the Turks, who for 500 years held the country in bondage. In 1830 she gained her freedom. Her first independent king was from the royal house of Bavaria, and she adopted his colors.

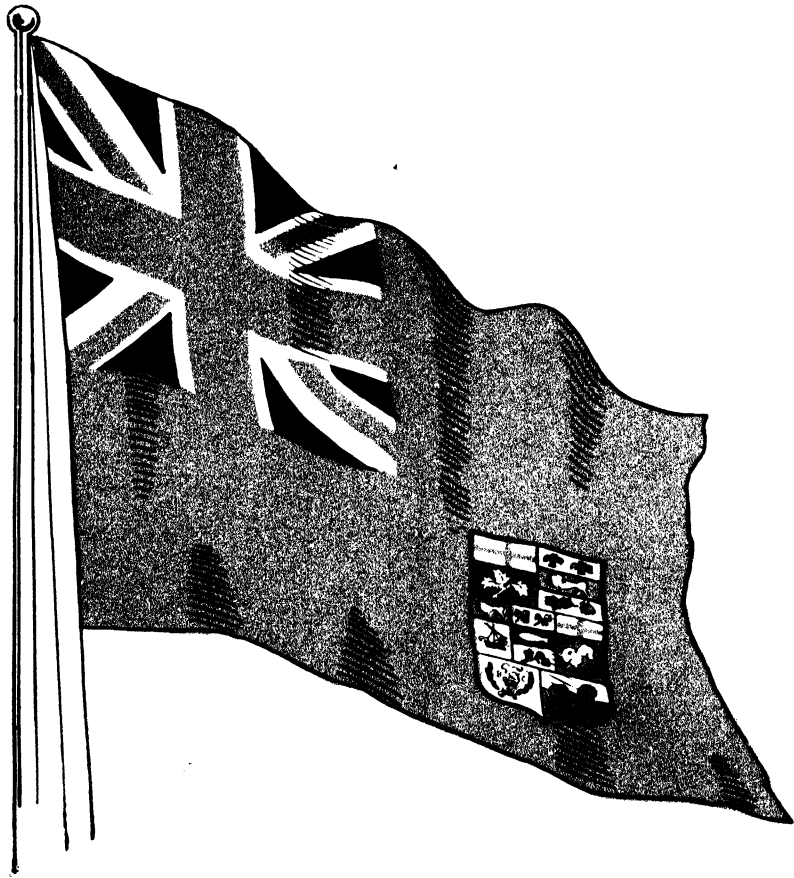
THE NEXT FAMILIAR THINGS BEGIN ON 1765.

THE FLAGS THAT FLY IN THE FOUR WINDS OF HEAVEN



THE FAMILIAR FLAGS OF FIFTY NATIONS

THE FLAG OF CANADA

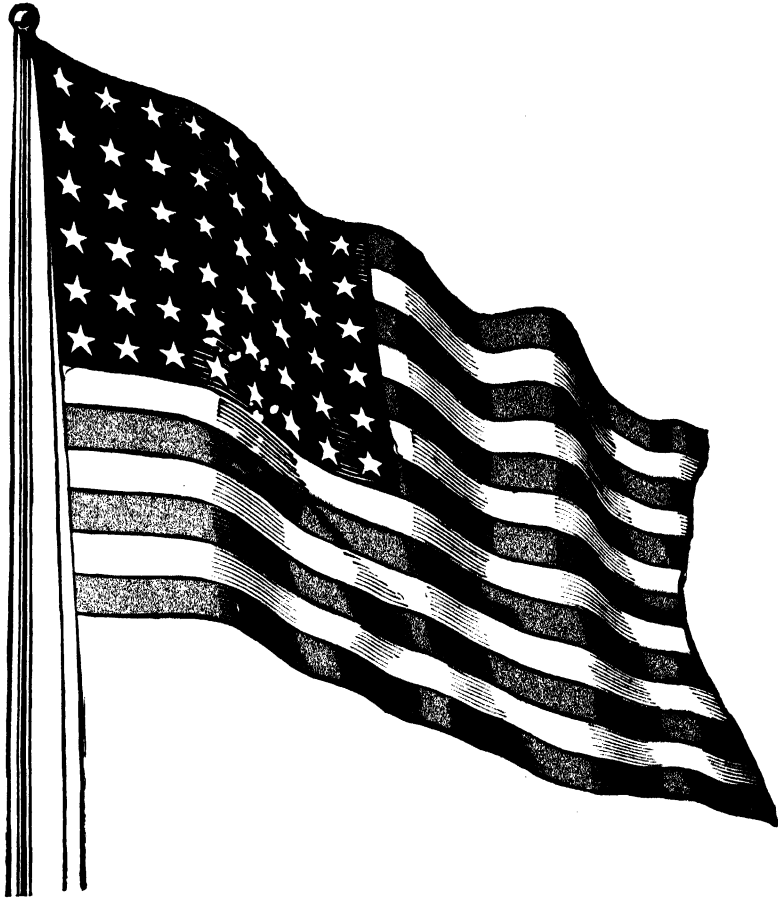


HAIL to the Great Dominion!
The home of the oak and pine,
Realm of the sunlit wheat-field,
Of the orchard, ranch and mine.
Niagara thunders praises
In sublime and endless key,
The northern waves applaud it
On the sand of the Hudson's Bay.

The wild Atlantic lauds her
On the coast of Labrador;
The broad Pacific answers
On the fair Vancouver shore.

Hail to the land of the Maple Leaf!
All hail to the Northern Queen!
Who wears the crown of the gleaming peak
And the robe of prairie green.

THE UNITED STATES FLAG



WHEN Freedom, from her mountain
height,

Unfurled her standard to the air,
She tore the azure robe of night,

And set the stars of glory there!
She mingled with its gorgeous dyes
The milky baldric of the skies,
And striped its pure celestial white
With streakings of the morning light,
Then, from his mansion in the sun,
She called her eagle-bearer down,
And gave it to his mighty hand
The symbol of her chosen land.

Flag of the free heart's hope and home,
By angel hands to valor given!

Thy stars have lit the welkin dome,
And all thy hues were born in heaven!
And fixed as yonder orb divine,

That saw thy bannered blaze unfurled,
Shall thy proud stars resplendent shine,
The guard and glory of the world.
Forever float that standard sheet!

Where breathes the foe but falls be-
fore us?

With Freedom's soil beneath our feet,
And Freedom's banner streaming o'er us!

The Story of FAMOUS BOOKS

THE WAVERLEY NOVELS

IN these pages we read two more of Scott's famous stories: "Ivanhoe" and "The Antiquary." The first is a romance of the return of Richard Cœur de Lion, or Richard "the Lion-hearted." In "Ivanhoe" we are, for the first time in the Waverley Novels, entirely in England. "The Antiquary" is a story of life not far from Edinburgh, on the southern shores of the Firth of Forth, in the last ten years of the eighteenth century. In the character of the sturdy old Whig antiquary, Jonathan Oldbuck, is reflected some of the author's own characteristics; and we are told that the novel was his favorite. The figure of old Edie Ochiltree, the garrulous, kind-hearted, wandering beggar, or "gaberlunzie man," has always been a favorite with Scott's readers. A beggar in those days wore a sort of uniform and had a licence to beg. An antiquary, of course, means one who devotes himself to the study of records and relics of the past.

WHEN KNIGHTS WERE BOLD BEING THE STIRRING TALE OF "IVANHOE"

THE period of the story, to quote Scott's own words, is that when Richard's return "had become an event rather wished than hoped for by his despairing subjects, who were in the meantime subjected to every species of subordinate oppression. The nobles, whose power had become exorbitant during the reign of Stephen, and whom the prudence of Henry II. had scarce reduced in some degree of subjection to the Crown, had now resumed their ancient licence in its utmost extent."

The scene of the story is "in that pleasant district of merry England which is watered by the River Don," where "there extended in ancient times a large forest, covering the greater part of the beautiful hills and valleys which lie between Sheffield and the pleasant town of Doncaster."

The forest was that of Sherwood or Rotherwood, numerous remains of which are still to be seen, and many parts of which are named after Robin Hood.

In romantic Sherwood, in the days to which the novel refers, there dwelt a brave old Saxon named Cedric of Rotherwood. In his service were a jester named Wamba and a swineherd named Gurth. One evening, as the sun was setting upon one of the rich grassy glades of the forest, these two were surprized by a party of horsemen. The travelers included a

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monk, Prior Aymer of Jorvaulx, and a Norman knight, Sir Brian de Bois-Guilbert, commander of the Order of the Knights Templars. They were on their way to Ashby-de-la-Zouch, where a tournament was about to take place. They sought the way to Rotherwood, the residence of Cedric. Wamba, not liking their appearance, gave them directions which would have taken them to Sheffield. But at the cross-ways they found a palmer, or pilgrim, lying on the ground asleep. To settle the point whether they should turn to the right or the left, as to which the monk and the knight were divided in opinion, they awoke the sleeper, who conducted them to Cedric's mansion.

Cedric was no lover of the Normans, but he put hospitality before his other feelings, and opened his doors to the new-comers. When supper had been served in the great hall, the steward, suddenly raising his wand, said aloud:

"Forbear! Place for the Lady Rowena!"

A door was opened behind the banqueting-table, and the ward of Cedric, followed by four female attendants, entered.

"Formed in the best proportions of her sex, Rowena was tall in stature. Her complexion was exquisitely fair; her clear blue eyes seemed to command as well as to beseech. Her

profuse hair, of a color betwixt brown and flaxen, was braided with gems. She wore a garment of pale sea-green silk, over which was a loose, flowing robe of crimson wool. Round her neck hung a golden chain, and a veil of silk, interwoven with gold, was disposed about her head and shoulders."

AROUND THE HOSPITABLE BOARD OF CEDRIC THE SAXON

Cedric was endeavoring to draw the Templar's undesirable attentions away from his ward, when some disturbance was caused by the arrival of an old Jew, who called himself Isaac of York, and who pleaded for shelter for the night, as a storm had arisen. To the anger of the Normans, Cedric gave orders that the Jew should be given a seat at the lower end of the table. Here it would have gone hard with him but for the courtesy of the Palmer, who had entered with the Norman party, but whose face had remained hidden behind his cowl.

Wine having flown pretty freely, Sir Brian began to boast of the prowess of the Norman knights in the Holy Land.

"Were there none in the English army," asked the Lady Rowena, "whose names are worthy to be mentioned with the Knights of the Temple and of St. John?"

"Forgive me, lady," replied Bois-Guilbert. "The English monarch did, indeed, bring to Palestine a host of gallant warriors, second only to those whose breasts have been the unceasing bulwark of that blessed land."

"Second to none," said the Palmer, who had stood near enough to hear, and had listened to this conversation with marked impatience. It is impossible to describe the bitter scowl of rage which rendered yet darker the swarthy countenance of the Templar, as the Palmer repeated his statement, mentioning the names of Richard and of five others, and adding that the name of the sixth, "of lesser renown and lower rank," dwelt not in his memory.

SIR BRIAN TELLS OF IVANHOE'S DEEDS AND CHALLENGES HIM TO COMBAT

"Sir Palmer," said Sir Brian de Bois-Guilbert scornfully, "this assumed forgetfulness comes too late to serve your purpose. I will myself tell the name of the knight before whose lance fortune and my horse's fault occasioned my falling—it was the Knight of Ivanhoe.

Nor was there one of the six that, for his years, had more renown in arms. Yet this will I say, and loudly, that were he in England, and durst repeat, in this week's tournament, the challenge of St. John-de-Acre, I, mounted and armed as I now am, would give him every advantage of weapons and abide the result."

"Your challenge would be soon answered," replied the Palmer, "were your antagonist near you. If Ivanhoe ever returns from Palestine, I will be his surety that he meet you." As he said this, the Palmer placed on the table a small ivory box containing a sacred relic. In reply, the Templar took from his neck a gold chain, exclaiming, "Let Prior Aymer hold my pledge and that of this nameless vagrant, in token that when the Knight of Ivanhoe comes within the four shores of Britain, he underlies the challenge of Brian de Bois-Guilbert, which, if he answer not, I will proclaim him as a coward on the walls of every Temple Court in Europe."

IVANHOE DEFEATS THE HAUGHTY TEMPLAR IN THE TOURNAMENT

The next morning, very early, the Palmer, who seemed to know exceedingly well the ways of Cedric's dwelling, made his way to the cell where the Jew slept, and bade him arise and escape, as the Templar had threatened to kidnap him. The Palmer offered himself to conduct Isaac to a place of safety. Whispering a word in the ear of Gurth, which greatly astonished that individual, the Palmer gained egress for himself and the Jew.

When the two had arrived at a spot beyond the domains of Bois-Guilbert's friends, Philip de Malvoisin and Reginald Front-de-Bœuf, the Jew astonished the Palmer by telling him that he had pierced his disguise—the Palmer was a knight—and induced him to accept a letter that would secure him the loan of horse and armor.

When the day arrived for the opening of the tournament at Ashby-de-la-Zouch, Sir Brian and his companions easily vanquished all those who entered the lists against them. Then, after a pause, a solitary trumpet announced the entry of another champion. It was none other than the knight who, disguised as a palmer, had caused the Templar so much annoyance in Cedric's banquetting hall. He entered the lists with his vizor down, and carrying a shield which

SCENES FROM THE TALE OF "IVANHOE"



In the time of Richard I., the Saxons had not quite forgiven the Normans for conquering them. But Cedric the Saxon was very hospitable, and even Norman knights were welcome to his table, at which his beautiful ward, the Lady Rowena, was always to be seen in the place of honor. Cedric is here leading Rowena into the banquetting-hall.



Cedric's son had been sent away because he had fallen in love with Rowena, whom Cedric meant to be the wife of another. One day a pilgrim came to Cedric's table, where some Norman knights were. A Jew also arrived, and as the Normans meant to harm him, at night the pilgrim whispered to one of Cedric's men, who helped the Jew to escape.



The pilgrim was Cedric's own son in disguise, and that was why the swineherd Gurth obeyed him. At the table the pilgrim had challenged a boasting Norman knight, Sir Brian, to meet in combat one named Ivanhoe. At the tournament the encounter took place, the Norman being overthrown by Ivanhoe.



The Lady Rowena awarded the wreath of victory to the knight of Ivanhoe, who, when his helmet was removed, was discovered to be none other than Cedric's son and her sweetheart. But the hero had many other adventures to face before he married the fair Rowena, as told in "Ivanhoe."

bore the legend "Disinherited." The Templar was overthrown, and this was the lot of his companions with the exception of one, whose horse, rearing at a critical moment, placed him at a disadvantage of which the Unknown Knight refused to avail himself, whereupon the Norman owned himself vanquished by courtesy.

On the second day, in a fight, the Unknown Knight was even more successful, though he would have fallen when engaged with Bois-Guilbert, had not a knight in black armor ridden up and felled Front-de-Bœuf, when the last-named was spurring to his friend's assistance. At the moment when the Unknown Knight, having removed his helmet, was receiving from the trembling hands of the Lady Rowena the chaplet of honor, he fainted. It was then found that he had been badly wounded. Cedric, rushing forward, then discovered, what his ward had discovered before him, that the knight was none other than his son, Wilfred, whom he had banished because of his love for the Lady Rowena.

THE MYSTERIOUS BLACK KNIGHT WHO CAME TO IVANHOE'S ASSISTANCE

Cedric dearly loved his son, but desired that his ward should marry another. The son of Cedric and Ivanhoe were one and the same. The Black Knight who had come so opportunely to Ivanhoe's aid in the lists was none other than Richard, the crusading King of England, whose younger brother, afterwards the bad King John, had tried to usurp his throne during Richard's absence in the East. Ivanhoe was carried from the field by friends, his father having conquered his first impulse to claim him.

While Cedric and his party were returning to Rotherwood they came upon Isaac and his daughter Rebecca. With these two was an ambulance containing an invalid, and they sought protection on their journey, as their men had taken flight and fled after hearing that a band of outlaws was lying in wait for the travelers in the forest. At Lady Rowena's intercession Cedric allowed the Jew to travel with him. Some time afterwards Cedric's party was attacked by a band of armed men, and taken prisoners, only Wamba escaping. The armed band was composed of the Templar and some of the followers of the usurper, John, who had been at

the tournament. Wamba sought out Robin Hood, and this doughty outlaw, with the Black Knight, whose identity was as yet unknown to Robin Hood, laid siege to the Castle of Torquilstone, the fortress of Front-de-Bœuf, whither the captives had been taken. They arrived just in time to save the Jew from horrible torture, the Lady Rowena from the evil-hearted De Bracy, one of John's adherents, and Rebecca from an evil fate at the hands of Bois-Guilbert.

ROBIN HOOD JOINS THE BLACK KNIGHT IN THE SIEGE OF THE CASTLE

During the siege Rebecca found her way to the turret, where the wounded Ivanhoe lay, and induced Ulrica, an old woman with whom he had been left in charge, to hand over the charge to her.

The noise within the castle, occasioned by the defensive preparations, had now increased into tenfold bustle and clamor. Ivanhoe, impatient of his wounds, was all eagerness to see how the battle went.

"If I could but drag myself," he said, "to yonder window, that I might see how this brave game is like to go—if I had but bow to shoot a shaft, or battle-axe to strike were it but a single blow for our deliverance! It is in vain! It is in vain! I am alike nerveless and weaponless!"

"Thou wilt but injure thyself by the attempt, noble knight," replied his attendant. "I myself will stand at the lattice, and describe to you as I can what passes without."

"You must not—you shall not!" exclaimed Ivanhoe. "Each lattice, each aperture, will be soon a mark for the archers; some random shaft—"

"It shall be welcome," murmured Rebecca, as with firm pace she ascended two or three steps, which led to the window of which they spoke.

THE BRAVERY AND FORTITUDE OF REBECCA THE BEAUTIFUL JEWESS

In spite of Ivanhoe's appeals, this brave maiden (who had come to love the knight) took an ancient shield for protection, and kept him acquainted with the tide of battle. When he heard of the Black Knight's prowess, Ivanhoe was at no loss to understand who it was that was so valorously coming to their aid. By the assistance of Ulrica, who, as an act of vengeance against Front-de-

Bœuf, had set fire to the castle, the besiegers were successful ; and it was in the arms of the Black Knight that Ivanhoe was carried out of the burning building.

But Rebecca was found by the Templar, and carried off by him to withstand a trial for witchcraft. Her fearlessness at length conquered the base heart of Bois-Guilbert, who begged and was given her forgiveness. He even meditated flight, but was induced by a wily counselor to maintain his position at the Castle of Templestowe, where it was arranged that Rebecca should be burnt, unless a champion should appear on her behalf against him. At the last moment a champion appeared. It was Wilfred of Ivanhoe.

When the Templar saw him, he said :
" I will not fight with thee at present. Get thy wounds healed, purvey thee a better horse "—Ivanhoe's horse was exhausted with many miles of travel—" and it may be I will hold it worth my while to scourge out of thee this boyish spirit of bravado."

But Ivanhoe insisted, and his knight-hood supported his claim, though Rebecca pleaded that he should not " perish alone."

In the result Ivanhoe, weak as he was with illness, went down before the well-aimed lance and vigorous steed of the Templar. But Bois-Guilbert also went down, though hardly touched, in comparison, by Ivanhoe's lance. " He had died a victim to the violence of his own contending passions." His death was pronounced " the judgment of God."

Rebecca was pronounced free and guiltless. At this moment Richard, with a goodly company, galloped on the scene. He had himself meant to champion the Jewess. He dissolved the Temple Chapter which had tried Rebecca. Once more in power, the King, having reconciled father and son, attended the marriage of Ivanhoe and the Lady Rowena in York Minster. Rebecca and her father soon after left England for Grenada, there to dwell in peace.

THE LOST HEIR OF GLENALLAN OR THE STRANGE STORY OF " THE ANTIQUARY "

ONE day in the eighteenth century two travelers between Edinburgh and Queensferry, delayed by the tardiness of the diligence or coach, lost the tide, and stopped for a snack at the Hawes Inn. One was a young man, of genteel appearance, named Lovel. He had been a soldier. The other was a good-looking man of about sixty, whose hale complexion and firm step announced that years had not impaired his strength or health. His name was Jonathan Oldbuck (or Oldenbuck), of Monkbarns, one of a family that had been established for several generations in the vicinity of the thriving seaport town of Fairport (supposed to be Arbroath).

Jonathan had no taste for commerce, and had experienced an equal distaste for the law when he succeeded to the estate. His instructor had said of him that " he never pays away a shilling without looking anxiously after the change, makes his sixpence go farther than another lad's half-crown, and will ponder over an old black-letter copy of the Acts of Parliament for days, rather

than go to the golf or the change-house ; and yet he will not bestow one of these days on a little business of routine, that would put twenty shillings in his pocket—a strange mixture of frugality and industry, and negligent indolence. I don't know what to make of him."

Mr. Oldbuck's manner at once interested and oppressed his fellow-traveler. Mr. Lovel, indeed, thought the old gentleman assumed an air of superiority that went beyond what the difference of age warranted. Both had their destination at Fairport, and though it was agreed that Mr. Lovel should call upon Mr. Oldbuck, the younger man delayed his visit till his baggage arrived, and he could present himself in a dress such as he thought corresponded with the rank in society he felt himself entitled to hold. It was not long before Mr. Oldbuck introduced his visitor to his " den " or retreat, where were amassed in extraordinary confusion all his antiquarian treasures. The laird was describing to his visitor the evidences of an old Roman encampment near his dwelling, when they were surprised by

the sudden appearance of a man who, having heard what Mr. Oldbuck had said, gave a very different description of what the antiquary had called the central point, or "pretorium" of the "camp."

EDIE OCHILTREE OF THE BLUE-GOWN, OR THE LICENSED BEGGAR

The new-comer—by name Edie Ochiltree—had the exterior appearance of a mendicant. A slouched hat of huge dimensions; a long white beard which mingled with his grizzled hair; an aged but strongly marked and expressive countenance, hardened by climate and exposure to a bright brick-dust complexion; a long blue gown, with a pewter badge on the right arm; two or three wallets or bags, slung across his shoulder, for holding the different kinds of meal, when he received his charity in kind from those who were but a degree richer than himself—all these marked at once a beggar by profession, and one of that privileged class of men who are called in Scotland the King's Bedesmen, or, vulgarly, Blue-Gowns.

Not only did this individual cause confusion to Mr. Oldbuck. He suggested to Mr. Lovel that he knew enough of his movements to cause the young man to be very liberal in the way of alms-giving. Mr. Oldbuck, it should be remarked, had arrived at the conclusion that his young friend was an actor. Mr. Oldbuck was considerably exercised in his mind by Mr. Lovel's reticence about his own affairs. And this feeling spread to the Sheriff of Fairport, who had heard a rumor that, because Lovel went on lonely walks, and made free use of his pencil, he was a French spy.

HOW THE HERO OF THE STORY WAS MISTAKEN FOR A FRENCH SPY

Fears of a French invasion were pretty general at this period, but apparently Mr. Lovel entirely removed the worthy magistrate's suspicions, though the sheriff kept the explanations, whatever they were, to himself.

There was a rivalry of a kind between Mr. Oldbuck and his neighbor, Sir Arthur Wardour, an impecunious and somewhat foolish Tory, who had also acquired a taste for antiquities. His daughter Isabel, and a son, now absent on foreign and military service, formed

Sir Arthur's whole surviving family. With Jonathan Oldbuck lived his sister, Griselda, and his niece, Mary MacIntyre. Invited to dinner at Monkbarns, Lovel made the acquaintance of these personages, except the baronet's son, soon after his arrival at Fairport. A heated discussion sent the guests home rather hurriedly, and the host was alarmed to learn that Sir Arthur and Miss Wardour had proceeded by way of the sands. This route had been taken by the baronet and his daughter when they found that Lovel was ahead of them on the turnpike road which led to Knockwinnock.

As Sir Arthur and Miss Wardour paced along, enjoying the pleasant footing afforded by the cool, moist, hard sand, Miss Wardour could not help observing that the last tide had risen considerably above the usual watermark. There was a sudden change in the weather. Then they saw the figure of Edie Ochiltree advancing through the haze to meet them. The mendicant told them their only chance of safety was to retrace their steps.

HOW LOVEL HELPED TO RESCUE HIS SWEETHEART AND HER FATHER

Despite all that Ochiltree could do, they were in despair, when Lovel was seen coming down the crags to the rocks on which they had found temporary foothold. By Lovel's help the baronet and his daughter were enabled to reach to a high rock. The rescue was finally effected by a party of fishermen got together by Oldbuck, who, when Sir Arthur and Miss Wardour were safely in their carriage, took Lovel home with him for the night.

The next day Oldbuck and Lovel went to call upon Sir Arthur and Miss Wardour at Knockwinnock Castle. Lovel and Miss Wardour had met before; indeed, Lovel entertained a tender regard for the baronet's daughter; and she, in her turn, was troubled at the thought that the circumstances of the previous evening had made her and her father so much the young man's debtors; also by the fact that Ochiltree had before this seen them both together. Miss Wardour bade Lovel dismiss his unfortunate attachment from his mind, leave a country that afforded no scope for his talents, and resume the profession

he seemed to have abandoned. His plea was that she should "have patience with him one little month, and if, in the course of that space, he could not show such reasons for continuing his residence at Fairport as even she should approve of, he would bid adieu to its vicinity, and, with the same breath, to all his hopes of happiness."

A GERMAN ADVENTURER TELLS STRANGE STORIES OF HIDDEN TREASURE

We learn next that Lovel was thought to be the son of a man of fortune, but there was some mystery about his birth, and that Miss Wardour, who had first met him at her aunt's house in Yorkshire, did not, when she saw him at Mr. Oldbuck's, choose to renew his acquaintance till she should know that her father approved of her holding any intercourse with him.

Another significant fact disclosed at this juncture in the story is that Sir Arthur Wardour was greatly in need of money, and was basing hopes of fortune upon certain discoveries of one Dousterswivel, a German adventurer who obtained money from him under the promise of finding hidden wealth by a divining rod. Dousterswivel had come to both the baronet and Mr. Oldbuck with strange tales of appearances of old shafts and vestiges of mining operations. Mr. Oldbuck was misled to a small extent by some idea that the Phœnicians had in former times wrought copper in the spot Dousterswivel pointed out, but Sir Arthur had risked ruin in the enterprize.

THE HERO IS WRONGLY SUSPECTED OF BEING AN ADVENTURER

Invited with Oldbuck to join a small party at the ruins of St. Ruth's Priory, and afterwards to dine and spend the evening at Knockwinnock Castle, Lovel met Captain Hector MacIntyre, the nephew of the antiquary, and at the outset a distinct coolness arose between these two, the new-comer paying marked attention to Miss Wardour. The captain, with some haughtiness, questioned his sister Mary about the antecedents of his uncle's new friend. He followed this up by directly questioning Lovel about the latter's regiment, and showed very plainly his doubt as to Lovel's replies, stating that he had no recollection of his name, though he knew the regi-

ment referred to and the names of the officers.

Dissatisfied with Lovel's replies to his questions, the Hotspur-like Captain MacIntyre suggests to him that his further visits to Monkbarns "must be dropped as disagreeable to him." Lovel's reply to the captain's emissary was that he should certainly visit Mr. Oldbuck when it suited him. The rejoinder to this was a request from the captain that "unless Mr. Lovel wished to be announced as a very dubious character he would favor the captain with a meeting in the ruins of St. Ruth." Lovel agreed to the meeting—with pistols—and secured a companion in an honest sailor, Lieutenant Taffril, whom he persuaded that, situated as he was, he could not discuss the subject of his family with any propriety.

HOW LOVEL FOUGHT A DUEL WITH THE ANTIQUARY'S NEPHEW

The meeting took place, despite the presence of Ochiltree, who did his best to prevent it. MacIntyre fell, begged Lovel's forgiveness, and bade him seek safety in flight, and this appeal being seconded by the mendicant, Lovel unwillingly allowed Ochiltree to lead him away into the recesses of the wood. At midnight, in the ruins, Ochiltree and Lovel witnessed an attempt by Dousterswivel to delude Sir Arthur with a bogus discovery of buried treasure and an equally bogus display of magic. The mendicant succeeded in giving the German a terrible fright, and in arousing the suspicions of the baronet on the score of Dousterswivel's honesty. Lovel next made his way to the seashore, and then on board Lieutenant Taffril's brig.

Meanwhile, Captain MacIntyre was being nursed at his uncle's house, whither Sir Arthur came for the double purpose of raising another loan and of acquainting Mr. Oldbuck with Dousterswivel's "find" of gold and silver coins in the ruins of St. Ruth. Sir Arthur was accompanied by Dousterswivel, and Mr. Oldbuck stipulating that all should visit the ruins together and seek by digging what could be found, the party set forth with picks and shovels. They were met by Ochiltree, who promptly recognized the horn in which the coins had been "discovered" as an old snuff-

box that had once belonged to him. The workmen, on the mendicant's advice, dug in a certain place. A chest of silver treasure was disclosed. When Sir Arthur and Mr. Oldbuck had gone away, the German was induced by the mendicant to meet him again for the purpose of unearthing further treasure. The old mendicant, who was also an old soldier, led the treasure-finder a sad dance.

Dousterswivel had another awful fright, on awaking from which his senses were further tried by witnessing the midnight funeral of the Countess of Glenallan.

With the advent of the name of Glenallan into the story, the reader becomes acquainted with a romance in the early life of Mr. Oldbuck, and with the secret of Mr. Lovel's birth. The old countess had been very jealous of her position, and fearing that her eldest son, Lord Geraldin, would marry a Miss Neville, who, for family reasons, had been treated as her husband's daughter, she suggested to the son that this relationship was a true one. But before she had approached him with this story his marriage to Miss Neville had taken place secretly. The young wife had died tragically after giving birth to a son, and the remainder of the days of her husband had been spent in sorrow and remorse. As for the son, he had disappeared, and no clue to his whereabouts had been discovered.

Mr. Oldbuck, who had been a suitor for Miss Neville's hand, had done all he could to shield her name from blame,

and had become convinced that Lord Geraldin was a villain. It was only after his mother's death that Lord Geraldin learned from old Elspeth, the countess's former servant, the truth of the deception that had been practised upon him. In the meantime twenty years had passed by. The new Earl of Glenallan sought and secured the interest and help of Mr. Oldbuck in discovering his child.

By this time the bailiff had come to Knockwinnock Castle. But his arrival was speedily followed by a message from Sir Arthur's son, who, by the aid of a friend, was able to enclose enough money to release his father from a very humiliating situation.

The friend was none other than Lovel, by whose directions the treasure unearthed at the ruins had been placed there, in order that Sir Arthur might be benefited without knowing at whose hands. To Sir Arthur's son Lovel was known as Major

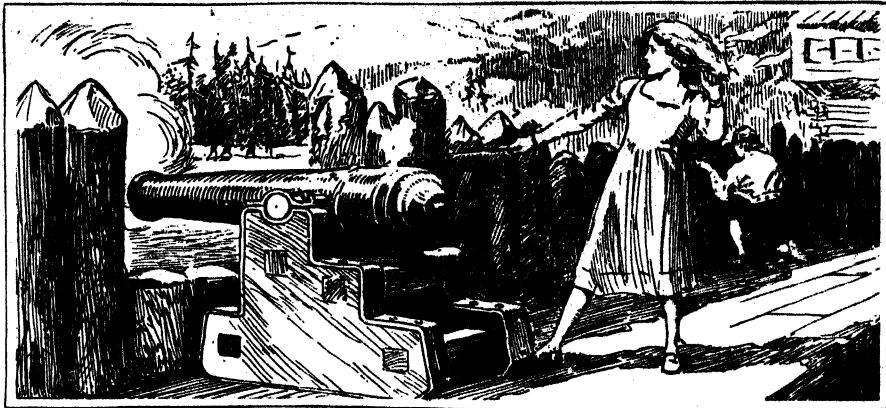
Neville, a distinguished officer in the King's service. It remains to be stated that Major Neville, who had been educated at the expense of Lord Glenallan's brother, and left his heir, was in reality the son of the earl. The restoration of the son to the father was followed by the marriage of the former to Miss Wardour.

Thus the tale of true love, though it had not run smoothly, ended in happiness, to the great joy of old Edie Ochiltree, whose satisfaction was all the greater because of Dousterswivel having been effectively unmasked.



EDIE OCHILTREE THE BEGGAR

This picture of the strange character who plays so prominent a part in "The Antiquary" shows how a licensed mendicant looked in Scotland less than two centuries ago. He wore a blue cloak and a badge, and carried a bag, into which he put the meals that were given him. Begging was then a regular trade.



THE GIRL WHO HELD THE FORT

MANY of us have heard or read of the dangers and hardships that our ancestors had to face as they tried to make a home or hold a settlement in this new country, then only a wilderness. Hunger and loneliness, hard toil and anxious waiting were among the least of their ills. Danger from Indians or wild beasts was an ever-present trouble. The same is true of the early French settlers in Canada.

Over two hundred years ago a log fort stood on the St. Lawrence River about twenty miles from Montreal. The land near the fort was cleared so that there should be no cover for attacking enemies and the open space served as pasture land for the cattle, and fields for the garrison. Around the fort itself was built a strong palisade made from the trunks of trees, stuck upright in the ground, and set so closely together that not even a bullet could penetrate the wall. In front of the fort and joined to it by a covered alley was a blockhouse where guns and ammunition were kept.

The commander of the fort was M. de Verchères. His family consisted of his wife, his two little sons of ten and twelve, and his daughter Madeline, a girl of fourteen. The fort was not heavily garrisoned for distances were great, and there were but few soldiers in those early days. M. de Verchères'

CONTINUED FROM 1331

company consisted only of twenty men who with their wives and families lived within the palisade. Besides keeping the defences in order, and occasionally making exploring or relief expeditions, the soldiers had to cultivate the fields, obtain fish from the river and game from the forest, to support the settlement. In harvest time nearly every one left the fort to work in the fields, for in the long hard winters food was very scarce, and often the boats from France failed to arrive.

It happened one day in harvest time that M. de Verchères, and all the soldiers, except two on guard at the fort, were out in the fields. Though he appeared quite calm the commander was uneasy and anxious on that beautiful day. Everything around seemed peaceful enough. The forest shone gorgeous in scarlet, green, and gold, and the river rippled lazily in the warm air. But a fur trapper going north had stopped at the fort the night before and had spoken around the watch-fire of a rumor that the Iroquois were on the war path. The man's words had been vague and it was unlikely that the Indians would dare to come so near to Montreal. Nevertheless, M. de Verchères' thoughts dwelt on the dark possibility and he made up his mind to hurry the harvesting, that he might keep watch within the fort.

He had hardly formed this determination when a scream pierced the summer stillness. One of the soldiers sprang high in the air and fell transfixed by an arrow. "The Iroquois! To the fort!" shouted M. de Verchères, but it was too late. In a long line that swiftly formed itself into a circle, the yelling savages enveloped the harvesters. The unequal fight was soon over, the Frenchmen quickly overcome, and the thirsting savages turned towards the forest to take counsel before they attacked the fort.

Madeline had been standing by the river when she heard her father's cry. She alone of all the harvesters had time to obey and she alone escaped. Besides herself there remained in the fort only the two soldiers, who had been on guard duty, an old man of eighty, some women and children, and Madeline's two brothers.

At the first sign of danger, the soldiers fled to hiding. As the Indians delayed their attack, Madeline went round to inspect the defences. She ordered the gaps in the stockade to be filled in and then ran down the covered alleyway to the blockhouse to look at the ammunition. There she found the two soldiers preparing to set light to the gunpowder and blow up the fort, rather than risk falling into the hands of the Indians. Her courage shamed them and they set themselves to defend the place. They and Madeline's two little brothers, who had been taught to shoot, opened fire from the loopholes.

"Crack! Crack! Crack!" the muskets rang out in quick succession. Through a loophole they could see the astonished savages scurrying back to the cover of the woods. Three forms lay still on the ground.

"The cannon," cried Madeline, and when it was loaded she fired it as a signal of distress. It frightened the savages, for they did not know that it was an appeal for help, which would be repeated from post to post till it reached the city of Montreal. How long would it be till help came? Could they deceive the Indians until that hour?

Hour after hour passed and there was not a sign of the Indians in the woodland beyond. All kept anxious watch, and once Madeline thought she saw the leaves of a low bush part and a coppery face look out; but she was not certain.

Late in the afternoon the watchers in the fort saw a canoe coming around the bend of the river.

"Here come La Fontaine, the settler down the river, and his family," cried one of the children.

Madeline frowned anxiously.

"We can't let them be killed," she said. She clutched her gun. "I will go out and meet them."

Slipping through the gate, she marched boldly, her musket on her shoulder, down to the wharf. There was no sign of movement on the edge of the forest. The Indians evidently believed that she was trying to lead them into some kind of ambush.

"Welcome, M. de la Fontaine," said Madeline. "The Iroquois are in the wood! March up behind me to the fort and do not hurry."

The little procession reached the stockade in safety.

Night came on, and had the Indians attacked them in the darkness, all would have been lost. Madeline ordered her elder brother and the soldiers to guard the women and children in the blockhouse, while she posted her young brother, the old man and herself as sentinels. All night long the sentries posted around the palisade cried at intervals "All's well!" and the man in charge of the blockhouse answered "All's well!" In this way they led the Iroquois to believe that there was a strong force in command of the fort and no attack was attempted. Once during the night Madeline's quick ears caught a soft sound of rubbing against the gates, and her heart beat faster.

"It sounds like the cattle come in from the field, Ma'm'selle," whispered old Gaston, who in his time had been a cowherd.

"I don't know," said Madeline doubtfully, "the Indians are full of tricks. They may be trying to fire the stockade. They might even be among the cows hidden in skins. Stay where you are. I will find out."

She crept around to the gate, and, opening it a little way, slipped out her hand. A cool, moist nose nuzzled into her palm. Reassured, she opened the gate a little wider, so that one cow at a time could slip in. "Bossy, bossy," she called softly, and the big animals lurched eagerly through the opening. As they passed her, she touched the

moist nose of each one with her hand to satisfy herself that there were no Indians hidden among them. They entered quietly, the soft pad-pad of their hoofs not distinguishable from the lapping of the waves, and noiselessly she closed and barred the gate behind them.

Day after day went by, until a whole week had passed. The Indians could now and then be seen watching the fort, but the place seemed too well guarded to attack, and they dared not venture out in the open to reconnoitre more closely. Big Eagle had done this on the second day, and that night Big Eagle's body had to be drawn back under cover of dark. So they watched and waited. The time seemed endless in the fort. All day and all night for seven horrible, anxious days, the watchers never left their posts. They snatched a little food as they stood at their posts, but as they ate it seemed to choke them.

On the seventh day, when they felt as though their powers of endurance could hold out no longer, help came. It was night when the succor arrived. Madeline sat in the living-room of the fort, her head on the table, fast asleep. Her gun lay across her arms. One of the sentinels called her.

"Ma'm'selle," he said, "I hear a noise down at the landing. Frenchmen or Indians are moving up the river."

"Which is it?" cried Madeline, springing to her feet, and hurrying out to the stockade.

Just then a loud knocking broke through the night sounds of the wilderness.

"Who goes there?" cried the sentinel.

"Who goes there?" cried Madeline.

"Frenchmen," was the response. "We bring you help."

Quickly the household gathered around and opened the gates. A young lieutenant marched in at the head of his company of soldiers. The relief was accomplished; the Indians had fled. The watchers in the fort could now rest secure. Madeline stepped forward, musket in hand, head high.

"Monsieur," she said formally, "I deliver the fort into your care. You have not arrived a moment too soon. My men are all worn out."

Then suddenly the strain of those awful seven days was too much for her. She forgot that she had been the stern

commander of a garrison, and remembered only that she was a little girl and very tired. With a weary movement, she put her head down in her hands, and began to cry. The lieutenant lifted her up in his arms and carried her into the house.

"You poor, brave, wonderful little girl!" he said. "It is time for you to go to bed."

That night M. de la Monnerie discovered traces of the Indians back in the forest and he decided to surprise them.

Accordingly, as the cold gray dawn broke over the river and forest the soldiers issued from the fort at a run, firing and reloading to fire again as they advanced. The Indians were not prepared, for they had planned to begin the attack and, believing that they had no chance, they hurriedly retreated, carrying off with them about twenty prisoners. The little French force could not follow them into the wilderness, but shortly after their departure a band of friendly Indians visited the fort, and learning of the attack, hastened after the retreating foe and surprised them on the shores of Lake Champlain.

In the battle that followed many of the Iroquois were slain and the rest put to flight. The French prisoners were recovered and restored by the friendly Indians to their own people, who had given up all hopes of ever seeing them again.

The news of Madeline's bravery spread far and wide throughout Canada, for M. de la Monnerie wrote an elaborate report of it to the Governor of Montreal. The Viceroy himself wrote her a letter and her heroism was rewarded by a pension. She grew into a brave woman, and later, had yet another adventure with the Iroquois, for her father's seigniory was directly in the way of the Iroquois when they marched against the settlers, and for that reason the fort was called Castle Dangerous. This time Madeline, rifle in hand, saved the life of Monsieur de la Perade, and later she married the man whom she had so gallantly rescued.

In Canadian History she is still remembered as the Heroine of Castle Dangerous. In the wigwams of the Iroquois, the squaws tell the little Indian boys of the white maiden, who, with an army of three men, had kept the fort for seven days against the whole tribe.

THE NEXT GOLDEN DEEDS ARE ON PAGE 174.

SIR ISAAC NEWTON STUDYING SUNLIGHT



This picture shows Sir Isaac Newton, the great scientist, experimenting with light. When in a garden he saw an apple fall to the ground, and this set him wondering why it fell to the earth and not into the sky. This led to his discovery of the great law of gravitation, by which we can explain the movements of the earth and the other planets, and to many other wonderful discoveries concerning the laws of Nature.



SHAKESPEARE

The Book of MEN & WOMEN



MILTON



MEN WHO MAPPED THE SKIES

PEOPLE often make fun of "star-gazers," but they would be very badly off if it were not for the star-gazers. Our great Navy would be practically useless. Without the help of the astronomers we could not steer at night, or out to sea. Our trains would run greater risks than they now do when traveling at night. Our almanacs would soon be out of date and useless. All would be chance and risk, for we should have no time-keepers, no guides.

Astronomy is the science which tells us all that is known about the heavenly bodies, and astronomers are the men learned in the science. We depend upon that science and upon the men learned in it for the government of our everyday life. It is probably the oldest science of all. It is certainly one of the most wonderful, and has the strangest, most interesting history.

The first astronomers were the ancient shepherds who watched their flocks by night in the fields, and gazed up into the brilliant skies, wondering what all the bright stars meant. Ignorant as they were, they made guesses at the meaning of the stars. We do not know who began the study. We know that the

CONTINUED FROM 1620



Chaldeans and the Egyptians were among the first; but India and China claim to have begun the study of the skies three thousand years before the Wise Men of the East followed the bright star to where Jesus was born in Bethlehem.

No doubt the Chinese astronomers would have been glad if their sovereigns had not been so interested in astronomy. For the men who studied the skies had to prophesy the date when an eclipse of the sun would take place, so that the people might get ready with gongs, and drums, and make noises, to frighten away the monster who, they believed, appeared in the sky to swallow the sun. If the astronomers failed to prophesy correctly, they were killed.

This shows us that the Chinese understanding of astronomy was not very clear; nobody's was in those early days. The first man to make an intelligent study of it was Thales, one of the Seven Wise Men of Greece. He was born in the year 640 B.C. and died in 546, and he gave all his life to the examination of the problems of Nature. He was the first to see that the sun and moon and stars were something more than signals placed in the sky

JULIUS CAESAR

HERBERT SPENCER

to mark the operations of demons and gods, and he was the first to draw maps showing the position of the most noticeable stars in the heavens.

About 400 years passed away before another great thinker took up astronomy. This was Hipparchus, a Greek scholar, who was doing his work about 150 years before the birth of Christ.

HIPPARCHUS, THE GREATEST OF ALL THE ANCIENT ASTRONOMERS

Hipparchus made a close study of the heavens, and was able, in a rough-and-ready way, to predict what would happen in the skies. This was different from the prophesying of the magicians, of whom the Bible tells us. Theirs was fraud and guess-work. Hipparchus prophesied because he had scientific knowledge. Moreover, he first brought astronomy to the assistance of geography, and made maps of the heavens, and of so much of the earth as was then known.

This does not seem much to us to-day, but it was really wonderful so long ago, when very little was known of science, and when there were no scientific instruments for measurements. Hipparchus found out that the year as counted by the sun was shorter than the year counted by the stars. This he learned by making measurements and comparing them with measurements taken 150 years earlier by Timocharis, another diligent student of the heavens. Hipparchus was the greatest of all the ancient astronomers, for his observations enabled him to write with skill about the sun and moon and the planets, and to fix the time of their movements with accuracy. Had another such man soon arisen, astronomy would before long have become a great science.

HOW PTOLEMY LED THE WORLD ASTRAY FOR THIRTEEN HUNDRED YEARS

But nearly 300 years went by before another famous star-gazer arose, and he did, perhaps, more harm than good. This was Ptolemy Claudius, an Egyptian mathematician, who lived in the second century after Christ. He carefully studied the works of Hipparchus, though nobody else seems to have preserved a copy. In addition to this study he did independent work. He discovered important changes in the course of the moon, and he discovered that light, coming from a distant star, on entering

a thicker atmosphere, is refracted—that is, turned aside from the path which it was pursuing. So far so good.

The mischief that Ptolemy did was to declare that the earth exists as a fixed body in the midst of the universe, and that the heavens revolve round it once every twenty-four hours. For the next thirteen hundred years all the civilized world believed his theory to be true. People believed, during all that time, that the sky was a great solid vault, turning round on a mighty axis which fitted into fixed sockets, and that the stars were attached to the surface of the vault, by nails, or other wonderful fastenings.

Not the whole of this belief lasted up to the time of Copernicus, but the Ptolemaic system did. After the Greeks, the Arabs took up astronomy. They found the works of Ptolemy, seven hundred years after his death, and never questioned the theory. They worked on in the belief that all was as Ptolemy had said, and their own observations were added to the store of known facts; but they never came any nearer to the real truth than Ptolemy himself had done long before.

COPERNICUS, WHO SAT IN A TOWER AND WATCHED THE STARS

The modern history of astronomy dawned with Nicholas Copernicus, who was born in Poland in 1473, and died in 1543. His father, who was a trader, died while Nicholas was still a child. Happily his mother's brother, who was a priest and afterward became a bishop, undertook his education, and later sent him to the University of Cracow. Here he studied for the priesthood and also mathematics. Afterward he went to Bologna, where he learned astronomy as well as church law, and a few years later he went to Padua to study medicine.

Copernicus, as soon as he could, settled down as a canon at his uncle's cathedral, and devoted his days to relieving the sick and suffering, to preaching, and to the study of astronomy. He read all that he could of the old writers on astronomy, and his clear mind saw that there was something wrong in the conclusions which Ptolemy had reached. Night after night he would sit up in a tower and watch the silent stars, pondering on their mystery. He saw that the sun does not go round

the earth, but that the earth and the other planets go round the sun. But it was terrible to think such a thing in those days. All people held that God had made our earth the centre of the universe, that ours was the greatest and most important planet in the universe, and that all the heavens obediently attended, meekly whirling round and round us. If it were believed that the earth was not the centre of the universe, then some pious men said the importance of the earth disappeared, except for the fact that it was the home of man. These people did not see that the fact of man, God's highest creation, living upon the earth gave the earth a crowning glory such as, perhaps, no other planet possesses. They had agreed that the earth was the centre of the universe, and it was held that only the sinful would dare dream anything else.

Copernicus wrote a book to prove his new theory. In many ways it was faulty, but it contained great and wonderful truths, and was the foundation of modern astronomy. He knew the danger he ran, and he feared to give his book to the world. For years he kept it by him. He was drawing near to death when he at last ventured, and he received the first printed copy of his work on the very day that he died.

THE GREAT BOOK THAT COPERNICUS PRINTED ON THE DAY HE DIED

The book at first reached the hands of only a few educated people, so the Church did not much mind, and nothing was done concerning it for seventy years. Then the Church forbade people to read it.

Here we must say a word for the first Englishman interested in astronomy. This was Robert Recorde, who was born at Tenby, in Wales, in 1510, and died in 1558 in a London prison, where they sent poor men who owed money. He taught mathematics and medicine at Oxford, but settled down in London, where he had the opportunity to make much money; but he seems to have been careless, so that he became imprisoned for debt.

He was, as far as we know, the first man in England to agree with the new views put forward by Copernicus, and he was the first Englishman ever to write on astronomy in English.

Now we cross again to the Continent,

to make the acquaintance of a famous Dane, named Tycho Brahe, who was born at Knudstorp, Sweden, when that town belonged to Denmark, in 1546, and died at Prague in 1601. Some boys have to struggle against poverty when learning, but Brahe had to struggle against riches. His parents were distinguished people, and they hated the thought of their son studying for the love of learning. Wishing him to be a lawyer, they sent him to university after university that he might study law.

TYCHO BRAHE, THE RICH YOUNG DANE, AND HIS CITY OF THE HEAVENS

But all the while his heart was in the heavens. He had only a pair of compasses in the way of scientific instruments, but with these he set himself, when fourteen years of age, to study the distance of the stars. In spite of hindrances, he became famous as an astronomer, and when he was thirty his work attracted the notice of the King of Denmark, who gave him a pension, and built him the finest observatory that the world had up to that time seen. This was on an island near Copenhagen, and was called by a name which meant the City of the Heavens.

Here for twenty years Brahe worked at the task he loved. Copernicus had been three years dead when Brahe was born, but Brahe studied the great man's works, and improved upon them. He did not believe that the ideas of Copernicus were quite right. It seemed impossible to him that the earth could be the tiny globe which Copernicus's theory made it appear. Great as was the mind of Brahe, it was not great enough to receive that truth. He favored the belief of Ptolemy, that the sun went round the earth. The other planets, he said, undoubtedly go round the sun, but he believed that they and the sun go round the earth, which is fixed, and not to be moved out of its place.

THE SORROWS OF TYCHO BRAHE AND HOW GOOD CAME OF THEM

That was his great mistake. But his work was very valuable. He discovered new laws governing the motion of the moon; he helped forward knowledge with regard to comets, and he worked out, more accurately than anybody else had done since the days of Hip-

parchus, the position of some of the most important stars.

Brahe had many sorrows to bear when his friend the king died. His pension was stopped, his splendid observatory was broken up, and he had to go to Prague, where the Emperor Rudolf became his friend. It was a good thing for the world, for there Brahe met a youth who was to become even a greater astronomer than himself.

BRAVE JOHN KEPLER AND HOW HE READ THE MYSTERY OF THE STARS

This was John Kepler, the great German astronomer, who was born in Württemberg, in December, 1571, and died at Ratisbon in 1630. His parents were poor gentlefolk, who managed to give him a good education, but had no riches for him. He was educated at a monks' school, and when twenty-two was appointed to lecture on astronomy. Up to then he had had no special love for the science, but he had read the writings of Copernicus, and believed in them. From this time forth he gave his life to the study of the skies.

He was always poor, and often, in later life, had difficulty in getting money enough on which to live. He had trouble also with the Protestant pastors.

What he desired to know was: How were the great bright bodies in the solar system kept in their position? He made many daring attempts to find the right answer. Some were well on the way towards the discovery; others were wild and wide of the mark. He wrote a book on what he had thought and done, and this brought him to the notice of Brahe, who had him appointed assistant to himself. Brahe had only two years to live, but those years were precious in the history of astronomy.

THE GREAT THINGS THAT KEPLER DID, AND THE COMING OF GALILEO IN ITALY

He taught Kepler all he could, and at his death left him all his papers and instruments, and all the facts which he had worked out. Kepler was appointed to the place which Brahe had held, and never rested until he had worked out the answer to the great questions which he had set himself. He discovered the laws which enable us to tell the place of any planet in its orbit—that is, its path through the skies—at any time past or present. Kepler's Laws became the

foundation of the new astronomy studied on scientific lines.

All this time few men had ever seen the sky through a telescope. The great discoverers of the secrets of the heavens had had to do their work with unaided eyes. Galileo was the first real astronomer to turn a telescope towards the sky. He did much more than that. His name was Galileo Galilei. He was born at Pisa, Italy, in February, 1564, and died at Arcetri, near Florence, in 1642. His family had been distinguished, but his mother and father were poor, and they were anxious that he should have a good education as a doctor. They did not want him to study mathematics, lest the knowledge should lead him away from the profession which they wished him to follow. He was a very clever boy, showing skill in mechanics, in modeling, and in music; and he painted with such art that, had he been born earlier, he would certainly have followed the calling of an artist. He wished to be one, and on entering Pisa University he saw that to be a good artist he must learn something of geometry. The study of this subject opened new fields of knowledge to him.

HOW GALILEO GAVE THE DOCTORS THE FIRST MACHINE THEY EVER HAD

He read of the experiments of Archimedes, and how that great man had found out the quantity of base metal in his king's crown. Galileo saw that there was a simpler way than that of Archimedes, and he invented a balance which would solve the problem more quickly. He wrote an essay on it, which so pleased a great man that Galileo was appointed to lecture on mathematics at Pisa, and to continue further studies in the way that he had begun. There was now no further talk of his being either a doctor or an artist. He was allowed to follow science all the days of his life.

But before all this he had done something for the doctors which nobody else had done. He noticed a great lamp swinging in the cathedral at Pisa, and saw that, no matter how long or how short its swings, its beats were regular. This set him thinking, and he invented the first pendulum, and used it to measure the human pulse, so that by its aid a doctor could tell how fast the

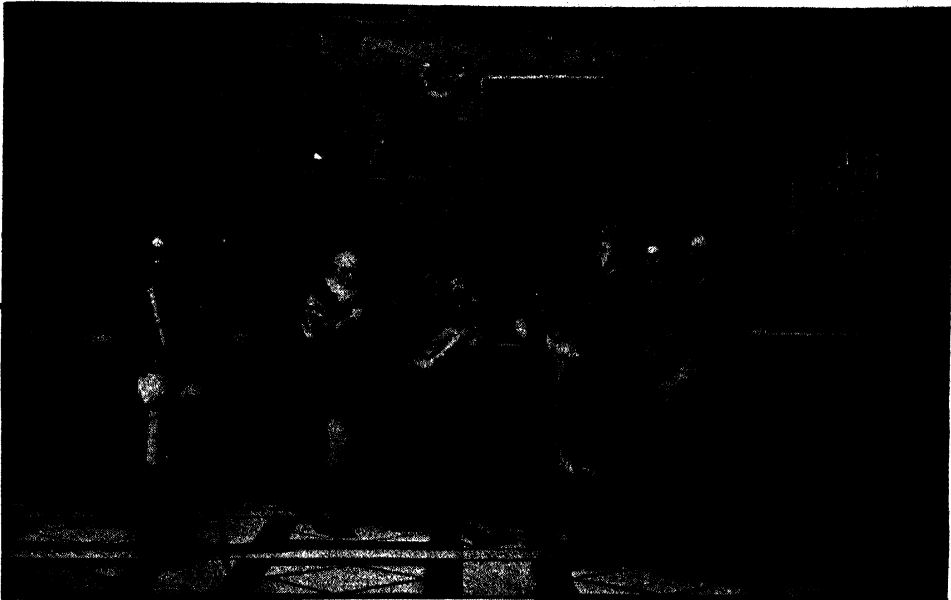
THE MEN WHO MAPPED THE SKIES

heart of a patient beat, and with what strength or weakness. That was the first mechanical contrivance ever made to help the doctors in their treatment of the human body.

While studying at Pisa, Galileo felt convinced that much of the teaching of the day was wrong. People still believed in Ptolemy's system of astronomy, but for other mechanical laws they accepted what had been written by Aristotle, a scholar who, born nearly 400 years before Christ, became the tutor of Alexander the Great. Aristotle was a wonderful man, but not all that he said was right. One of his beliefs was that,

according to Aristotle, the shot weighing ten pounds should have reached the ground in one-tenth of the time occupied by the shot weighing one pound. But they both reached the ground together. Galileo rejoiced at this proof, but the followers of Aristotle were furious. They would not believe what their eyes showed them. They could show by the books of Aristotle, they said, that such a thing could not be. But Galileo declared that, except that air resists a light article a little more than it does a heavy article, all bodies fall at the same rate. This declaration made everybody very angry, and students and

THE TRIAL OF GALILEO, WHO WAS PUNISHED FOR ATTACKING OLD IDEAS



Galileo, one of the first to make a telescope and look through it, was also one of the first to teach that the earth was a ball moving round the sun. Churchmen disbelieved him and brought him before the Inquisition. The Inquisitors tried to make him say that he was wrong in what he taught. After denying that the earth moved, we are told that he added under his breath, "And yet it *does* move," but this story is untrue.

if two bodies of the same substance fall from the same height, the heavier body will reach the earth first; that a body twice as heavy as another body must reach the earth in half the time of the lighter body. For 1,900 years nobody had thought of questioning this. Galileo was the first to do so. He saw that it was wrong, and he said so.

He took two shots, one weighing ten pounds and the other weighing one pound. He let them fall from the top of the leaning tower of Pisa, of which there is a picture on page 319. Now,

professors at the university became his enemies.

Soon there was another grievance against Galileo. A powerful man wished to dredge the mud out of Leghorn harbor. The model of his machine was shown to Galileo, who said that it would be impossible to do the work with it. What he said was proved to be true when the work was actually tried; but, in the meantime, his honesty made his enemies so angry that he had to flee from Pisa to Florence.

Here his lot was miserable. His

father died; and Galileo now had his mother, a brother, and two sisters depending upon him. After two unhappy years he was made professor of mathematics at Padua. He was now 27 years old, and remained at Padua for eighteen busy years. He did an enormous amount of work for science, and people flocked from all parts of Europe to hear his lectures.

HOW GALILEO WITH HIS TELESCOPE FOUND THAT ARISTOTLE WAS WRONG

He was poorly paid, and had to act as tutor to pupils—many of whom became famous men—in order that he might have money enough for the wants of himself and his family. At the beginning of his career he had believed in Ptolemy's system and had taught it to his pupils; but, as he learned more, he saw that Copernicus was right; and, though he knew that to teach Copernicanism meant danger to himself, he did teach it.

In 1609 he improved the telescope. Some had been made in Holland for use on land, but Galileo made a better one, for seeing the sky. We must not stay here over the making of the telescope, of which we read in another part of this book. The first thing that Galileo examined with his telescope was the moon. He saw that it was like our earth, full of mountains and hollows. The followers of Aristotle would not believe this. The moon was perfectly round and smooth, they said. But greater wonders were to follow.

Galileo discovered, by the aid of his glass, that the system of planets was not quite what had been thought. He found that there were lesser planets revolving round Jupiter, just as other planets revolve round the sun. This excited the enemies of Galileo more than ever. How could such things be, they cried. One of them said: "There are only seven openings in the head—two eyes, two ears, two nostrils, and one mouth; there are only seven metals, and seven days in the week, therefore there can be only seven planets."

HOW AUTHORITIES GREW AFRAID AND TRIED TO STOP THE SPREAD OF TRUTH

Galileo made them look through the telescope, and there were the heavenly bodies to be seen. "Oh, well," they said, "they are not visible to the naked

eye, so they cannot exercise any influence on the earth; and, being useless, therefore they do not exist." The discovery brought Galileo new fame, and he was persuaded to go to Florence at a much larger salary. He discovered many other things in the sky, and showed that, although the earth goes round the sun, the sun itself turns round also.

Now, in 1600, Giordano Bruno, born near Naples about 1548, who had taught many strange theories of religion and science, was burned to death as a heretic. Galileo was not influenced by that. He declared, as Bruno had declared, that Copernicus was right. He declared, too, that the stars and planets are made of the same substance as the earth; that the universe is not limited, but unlimited in extent.

The Church now became aroused. It turned in 1611 to the works of Copernicus, and declared that they should not be read. A commission to investigate what he had taught, conducted by officers of the Church, summoned Galileo before it, and warned him not to teach that the earth goes round the sun. If he did not agree, he might take the consequences of his conduct. He was not punished however at this time.

HOW GALILEO WAS PUNISHED AND WROTE BOOKS TILL HE WAS BLIND

Sixteen years passed away, and then Galileo continued his studies and finally wrote a book defending the Copernican system. For his disobedience he was again called before the Inquisition. In sackcloth, he was made to kneel and swear he would never again say or believe the earth moves round the sun.

He was now an old man, and perhaps feared that the torture awaited him if he disobeyed. So unwillingly he swore. Then he was sent away as a prisoner, but was afterwards given his liberty, though spies watched him to the end of his days. He worked at his discoveries in the heavens, and wrote books of the highest importance, till he became blind. The man, who, more than any other, was to teach us what the heavens show us, was himself unable to see their glories. He died when seventy-eight, conquered, but not before he had given the world a great heritage of knowledge upon which much that we know of natural

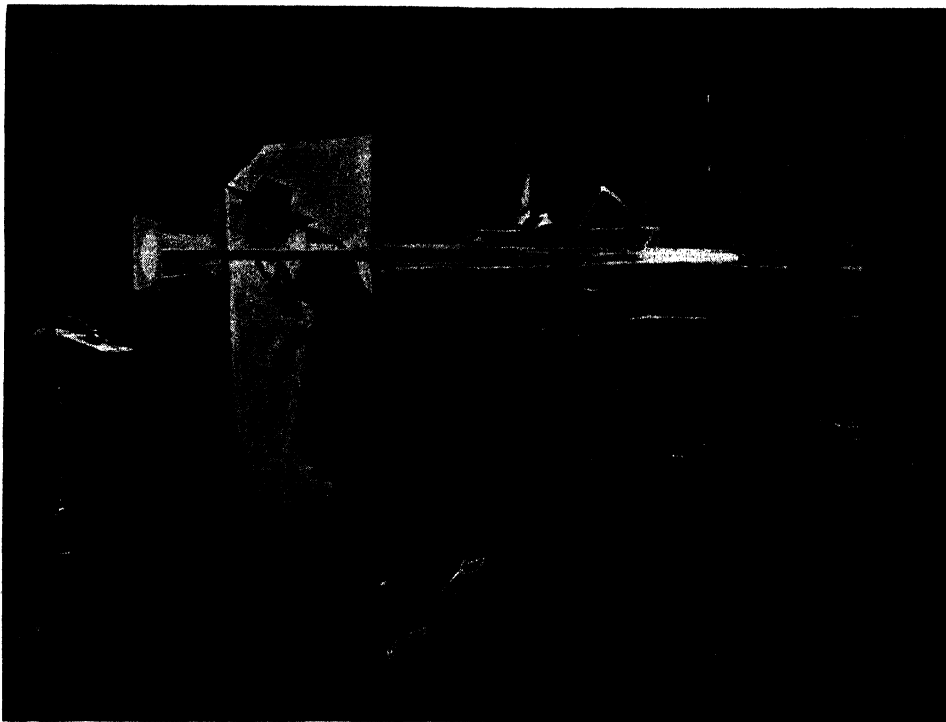
THE MEN WHO MAPPED THE SKIES

science has been founded. We see how man after man built upon the foundations laid by those who had gone before. Copernicus and Kepler and Galileo prepared the way for Jeremiah Horrocks, "the founder of English Astronomy," who observed the transit of Venus, and Sir Isaac Newton, the great Englishman, who was born at Woolsthorpe, Lincolnshire, in 1642, and died in London in 1727. He was a dull boy at school, yet he beat all the other students at mechanics

conclusion that all things are drawn towards the centre of the earth. Then, going a step further, he discovered that the planets are drawn towards the sun in the same way. Little by little he discovered the law of gravitation, which explains the movements of the heavenly bodies.

We get a great lesson in patience and care from Newton. At the beginning he could not explain the movements of the moon and planets, because he had

THE FOUNDER OF ENGLISH ASTRONOMY WATCHING THE SHADOW OF A PLANET ON THE SUN



This picture, painted by Mr. Eyre Crowe, shows Jeremiah Horrocks, "the founder of English Astronomy," observing the transit of Venus. He darkened his room at the date—November 24, 1639—which he had alone predicted, and placed a tube out of the window pointing towards the sun. Then, by placing a board at the opposite side so that the disk of the sun was thrown on it and moving it as the sun moved, he was enabled to watch the shadow of Venus cross the disk of light. He was thus able to calculate the size of the planet. He died at the early age of 23, but made other useful discoveries in astronomy, and concerning the ocean tides.

and mathematics, and in course of time he became famous at Cambridge University. Galileo had given the world the law of bodies falling to the earth, but nobody had thought that such laws might affect the heavenly bodies. One day Newton, when sitting in his garden, saw an apple fall from a tree. "Why should that apple fall?" he wondered. "Why did it not float away or rise into the air?" He thought out the problem and worked at it until he came to the

no figures upon which he could rely, giving the size of the earth. No matter what answer to his problem he wanted, that answer always came out incorrect, through the absence of the necessary figures. Here he was, on the eve of one of the greatest discoveries in history, but he put aside this work for seven whole years. Then, in 1670, a scholar named Picard produced reliable figures as to the size of the earth. Newton took up his work where he had left it, and

finished it in triumph. By this time men were beginning to realize the importance of astronomy, and it was proposed to King Charles II. of England that astronomers should find the longitude at sea, and so enable sailors to steer in safety and with knowledge of the course they were following.

John Flamsteed, who was born near Derby in 1646, and died in 1719, had gained a reputation by his researches in astronomy, and he was consulted about the proposal. He said that so little was known of astronomy that the proposal could not be carried out. So in 1675 he was appointed the first Astronomer Royal, and Greenwich Observatory was built solely that he might make careful observations of the stars, to enable sailors to find their way in safety across the seas. He did his work nobly, making maps of the stars such as had never before been seen.

PULLING DOWN A GATE AT THE TOWER TO BUILD GREENWICH OBSERVATORY

The observatory was begun in a very small way. A gate-house at the Tower was pulled down to provide wood; iron and lead and bricks were taken from Tilbury Fort; and \$2,500, obtained from the sale of spoilt gunpowder, provided the money necessary for wages, and so forth.

Flamsteed at first had only \$500 a year, and had to buy his own instruments. This makes his success all the more wonderful, especially when we consider that his health was so bad that he could hardly do his work, let alone teach the pupils, whose fees were necessary to enable him to live. He quarreled, as invalids do, with his best friends, among whom were Newton and Edmund Halley. The latter was a born astronomer. He was a native of London, where he was born in 1656, and before he was nineteen he had made such progress in astronomy as to be able to say that if a star were displaced in the heavens he would at once detect it.

When he knew that Flamsteed was making a map of the stars to be seen from our skies, Halley wished to make a catalogue of the stars seen in the southern skies, on the other side of the world. His father, who was rich, and proud of his boy, gave him money and consent, and young Halley rushed away from Cambridge without waiting to

take his degree, and spent eighteen months at St. Helena, making a map of 341 important stars which we on this side of the world never see. Afterwards he became Astronomer Royal in succession to Flamsteed, and did splendid work. He predicted the return of the comet which is named after him.

THE MAN WHO MADE ISAAC NEWTON PUBLISH HIS GREAT DISCOVERY

The most important thing he did, however, was to make Newton publish his great book. But for Halley, Newton never would have published it, and the world might have waited a century for the knowledge which that book, and that book alone, could give. Halley was made a captain in the navy in order that he might continue his study of the moon and stars, and the tides of the sea. He died in 1742.

James Bradley was Halley's successor. A native of Sherborne, Dorset, he was born in 1693, and died near his birthplace in 1762. His most important work was the discovery of what is called the aberration of light. We know that light travels to us from the stars, at the rate of 185,000 miles a second. What we see is not the star, but the light of the star. That light takes a definite time to travel to us, and while it is on its way here, the earth is spinning on its path through space; and we see the light of the stars, not in the place where the star actually is, but where the star was some time before. This was the first clear proof of the earth's actual motion, and it was his discovery of this that made Bradley famous.

THE FIRST WATCH TO HELP THE SAILOR TO FIND HIS WAY AT SEA

The next great Astronomer Royal was Nevil Maskelyne, who was born in London in 1732, and died at Greenwich Observatory in 1811. He did more than any of the others to find the longitude at sea. In his time the first watch which would keep time at sea was made. That was a great thing. With the help of this chronometer, which carried Greenwich time out to any part of the waters, mariners had now only to observe the position of the heavenly bodies, and by comparing the time where they were with the time of the Greenwich watch, they knew exactly where they were at sea.

After Maskelyne came Sir George Biddell Airy. He was born at Alnwick,

Northumberland, in 1801, and died at Greenwich in 1892. He did an enormous amount of work in mapping the heavens and applying his knowledge to geography on land and sea. It was he who brought the science to the pitch which it finally attained at Greenwich, so that it has been said by a great man, Professor Newcomb, that if all the knowledge of this branch of astronomy were utterly lost, it could be entirely replaced at Greenwich Observatory.

WILLIAM HERSCHEL AND HIS BRAVE SISTER CAROLINE

We must not overlook the Herschels, the most brilliant family in English astronomy, though they had nothing to do with the Greenwich Observatory. The first was Sir William Herschel, who was born a poor boy in Hanover, in 1738, and was trained as a musician to play in a band. When he went to England he studied mathematics and astronomy. He was too poor to buy a telescope, so he manufactured one for himself. With this he made some famous discoveries, of which the greatest was the planet Uranus. He was greatly assisted by his sister, Caroline Herschel, one of the cleverest and most lovable women that ever lived.

Caroline's mother did not love her, but made her a drudge in her poor house, and would not have her educated. Her father, who *did* love her, gave her music lessons in secret. A little music and a little knitting—those were her only kinds of work, apart from scrubbing and cleaning, up to the time of her father's death. Then she toiled to learn dress-making and other sorts of work, sitting up late at night, after she had done the housework. At last her brother, William, who was very fond of her, sent for her to come to him, and they lived at Bath, where he gave her singing lessons and taught her English and arithmetic, and she was much happier.

HOW CAROLINE HERSCHEL HELPED HER BROTHER TO BECOME FAMOUS

Caroline, on her part, learned to imitate the violin by humming with a gag between her teeth, so that she might perform at concerts and help the funds of the home. While her brother was making the telescope, Caroline became his cook and workshop "boy." She helped him to polish the glasses, she

cooked his food, and actually fed him with it while he was at work; she read books to him while he toiled. She sang at concerts with success, but gave up music to assist her brother in astronomy. She used to sit up all night with him to watch the stars. She copied his papers, helped him with his star-maps, kept the house, did the needlework, and entertained company. She used to fill up her spare time with polishing mirrors for his telescopes.

Seldom has there been another such woman as Caroline Herschel. She had her reward in time, for she herself became a wonderful astronomer, and made splendid discoveries. All her life was like a beautiful fairy story, right up to the end, when, her brother dying, she gave all her little savings to his son and family, and went back to live, not very happily, with her other relatives in Hanover. There she died, when ninety-seven years old, in 1848, honored by all the great men of Europe, and beloved and admired as few women have been.

THE BOOK THAT MADE CAROLINE HERSCHEL WEEP FOR JOY BEFORE SHE DIED

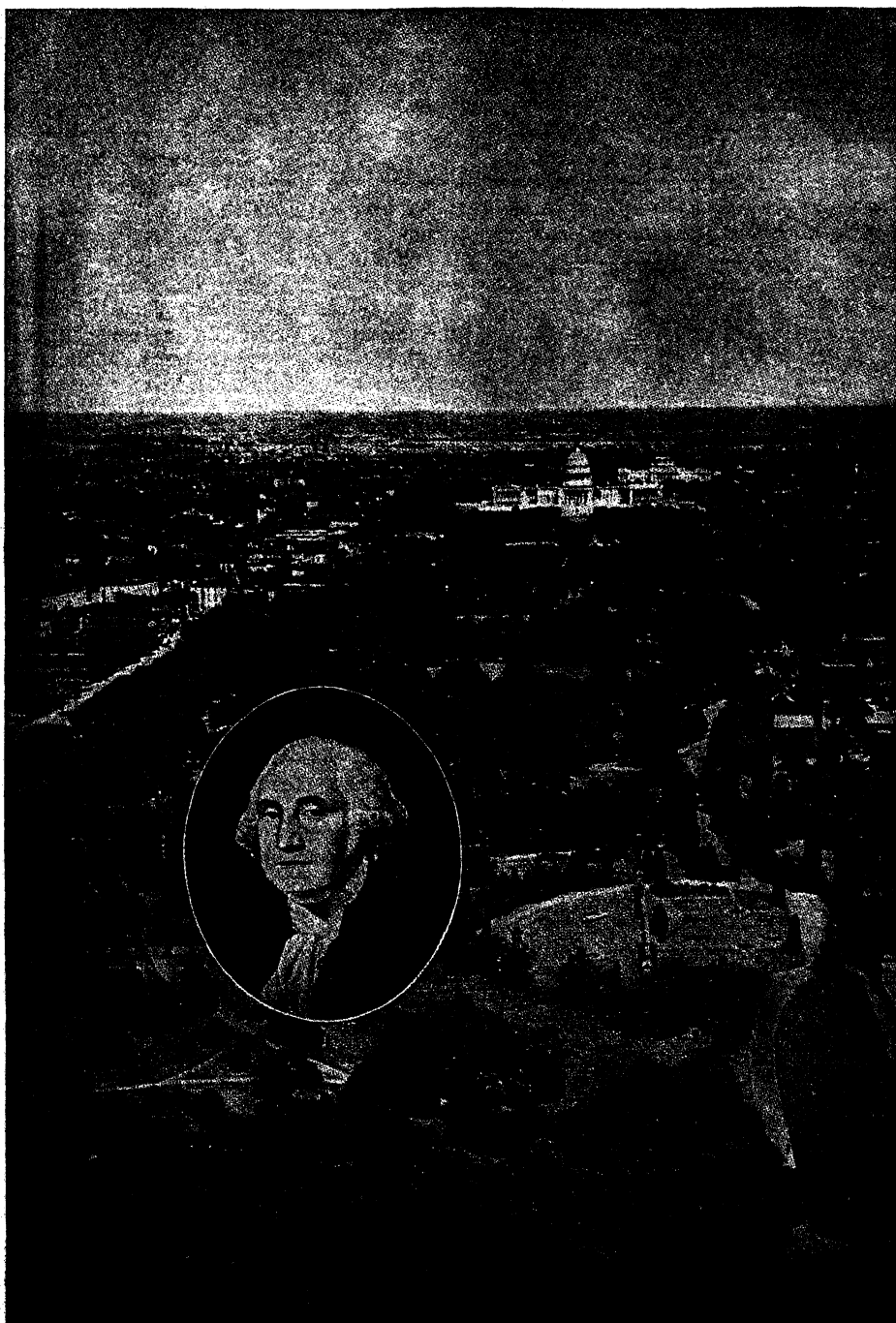
The nephew to whom Caroline gave part of her money was Sir John Frederick William Herschel, her favorite brother's son, and a greater astronomer than his father. He carried on the work which his father and aunt had begun. He made a catalogue of all the stars seen in our skies, then he went to the southern hemisphere and made a catalogue of the stars seen there. It was the greatest joy of his life that he was able to send a copy of the great book to Caroline Herschel just before she died.

This was his most splendid work, and the dear old lady wept with pride and pleasure at seeing what her nephew had done. She was the more happy from the fact, that in the noble book there was the result of the work which she had begun under difficulties when cook and observatory "boy" to her brother, and had continued when herself a world-famous astronomer.

To such men and women, struggling often with poverty and difficulties that we can hardly understand to-day, we owe our knowledge of the skies, of which men can now make maps as clear and as certain as the maps we make of our own country.

THE NEXT STORIES OF MEN AND WOMEN BEGIN ON PAGE 1745.

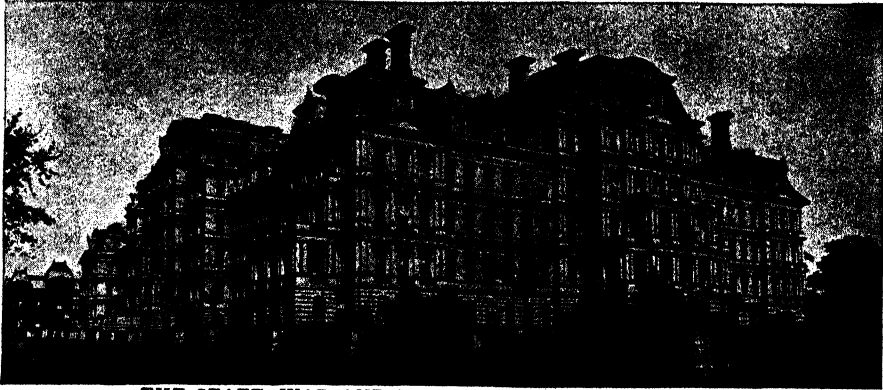
GEORGE WASHINGTON & WASHINGTON CITY



Here we have a picture of the city of Washington and the portrait of its founder. In the distance we catch a glimpse of the Capitol, and the Congressional Library beyond, and in the foreground we see the trees, the wonderful trees of our Federal City. The planting and cultivation of the trees in Washington come under the governmental authority, and a large sum is spent yearly upon their improvement.

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The Book of THE UNITED STATES



THE STATE, WAR AND NAVY DEPARTMENT BUILDING

WASHINGTON, OUR CAPITAL CITY

NOTHING so increases patriotism as a visit to Washington, where many for the first time realize the immensity of the nation, its wealth, its importance, and its world relations. We have seen the wonders of Yellowstone Park and have traveled through the weird underground world of Mammoth Cave. To-day we will take a trip in imagination along the broad vistas of the streets of our national capital and pay a visit to some of its most important buildings. It is morning when we reach the city. The first sight of interest that unfolds before our eyes is the big new Union Railway Station, where we alight. It is a huge building whose magnificent proportions dwarf into comparative littleness the early crowds of people who hurry through its great interior.

THE PEOPLE OF WASHINGTON NEVER HURRY

We emerge from the bustle of the station into the streets of Washington, and getting into a taxicab, tell the chauffeur to take us to the Capitol. As we pass along the street the first impression that we receive is that everything has come to a standstill. It is still early and the streets stretch out before us wide, tree-lined and seemingly almost deserted. Only an occasional trolley, automobile or tradesman's wagon passes us. Nobody seems

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CONTINUED FROM 1438

in a hurry. The pedestrians on the sidewalks walk leisurely along as if they had the whole day before them in which to accomplish their errands.

But we have reached the Capitol, and, "How magnificent!" we exclaim breathlessly, as we lean forward to get a better view of the great dome, the crowning glory of the Capitol. For a few minutes a majestic English elm partly obscures it from our view and we note the noble simple lines of the two—the great wide spreading tree and the dome, "hanging like a great brooding bubble" against the clear blue sky.

We leave our taxi at the eastern front and climb the broad flight of steps that lead to the rotunda of the Capitol. On each side of us is a colossal group of marble figures, one representing Persico's Columbus and an Indian girl, and the other a pioneer in desperate conflict with a savage. Before us are the beautiful bronze doors of Randolph Rogers, representing a series of scenes in the life of Christopher Columbus, from his first voyage in search of the New World, to his sad death at Valladolid in 1506.

Through these massive doors we enter the rotunda or interior of the dome. The Capitol possesses some interesting statuary and paintings, and as we pass through its halls, we may see them.

As we come into the great circular hall of the rotunda, we pause for a moment at the door to note the magnificent columned corridors spread out before us. The walls are decorated with a bewildering array of paintings, sculptures and frescoes. Over us the vaulted canopy of the dome is aglow with color. As we stand breathlessly gazing about us and wondering where we shall begin our inspection of the pictures, a guide who has been viewing us from the distance hastens forward and takes us under his wing.

The canopy, he explains, is an allegorical fresco, painted by Burnside, representing Washington surrounded by all the Arts, Sciences and Industries.

There are some paintings upon the rotunda walls that are worth noting—The Landing of Columbus, The Discovery of the Mississippi, The Baptism of Pocahontas, The Embarkation of the Pilgrims, and a series of impressive pictures, by Trumbull, showing scenes in the American Revolution. We wander along admiring these and the fresco by Brumidi and Castigini that encircles the wall. We mount into the whispering gallery just below the canopy, and as we stand there we can distinctly hear the murmured words of a party on the opposite side of the gallery.

SOME BAD STATUES OF OUR GREAT MEN

We visit the National Statuary Hall, one of the most beautiful rooms in the Capitol. It was once the Hall of the House of Representatives, before the new wing was built. It is semi-circular in shape and adorned with noble columns. The domed ceiling, decorated after the design of the Roman Pantheon, rises 57 feet to the cupola that lights the room. Around the room on their marble bases stand statues of men who have been famous in the history of our country. Many of them are very badly done and reflect more credit upon American patriotism than upon American art. Among these statues is one that arrests our attention—the figure of a woman—Frances Elizabeth Willard, the first woman to be given a place in Statuary Hall. The most interesting figure in the hall is the statue of Père Marquette, and there is in another place a fine head of President Lincoln of which you will find a picture elsewhere in this book.

As we turn and look at the door

through which we have just entered Statuary Hall from the rotunda, we pause to glance at the great clock above the door. Behind the clock is a winged car resting on a globe circled by the Zodiac. This car is meant to represent Time, the guide tells us. In the car is the marble figure of a woman called "History." The clock was designed by Franzoni, a sculptor popular many years ago.

We take a peep into the Supreme Court Room, once the Senate Chamber; and see the Hall of Representatives and the Senate Chamber, impressive in their simplicity—the semi-circular rows of seats so alive with an atmosphere of business that they seem just to have been left by their occupants.

As we pass through the corridor our attention is arrested and held by a picture on the wall of the landing of the West Stairway. It is called "Westward Ho" and has for its legend Bishop Berkeley's words, "Westward the Star of Empire takes its way." The picture represents an emigrant caravan stopping to rest in one of the defiles of the Rocky Mountains. The scene holds all the wild grandeur of the rough mountain pass, yet beyond is a glimpse in the distance—the Land of Promise—a land wonderfully fair to see.

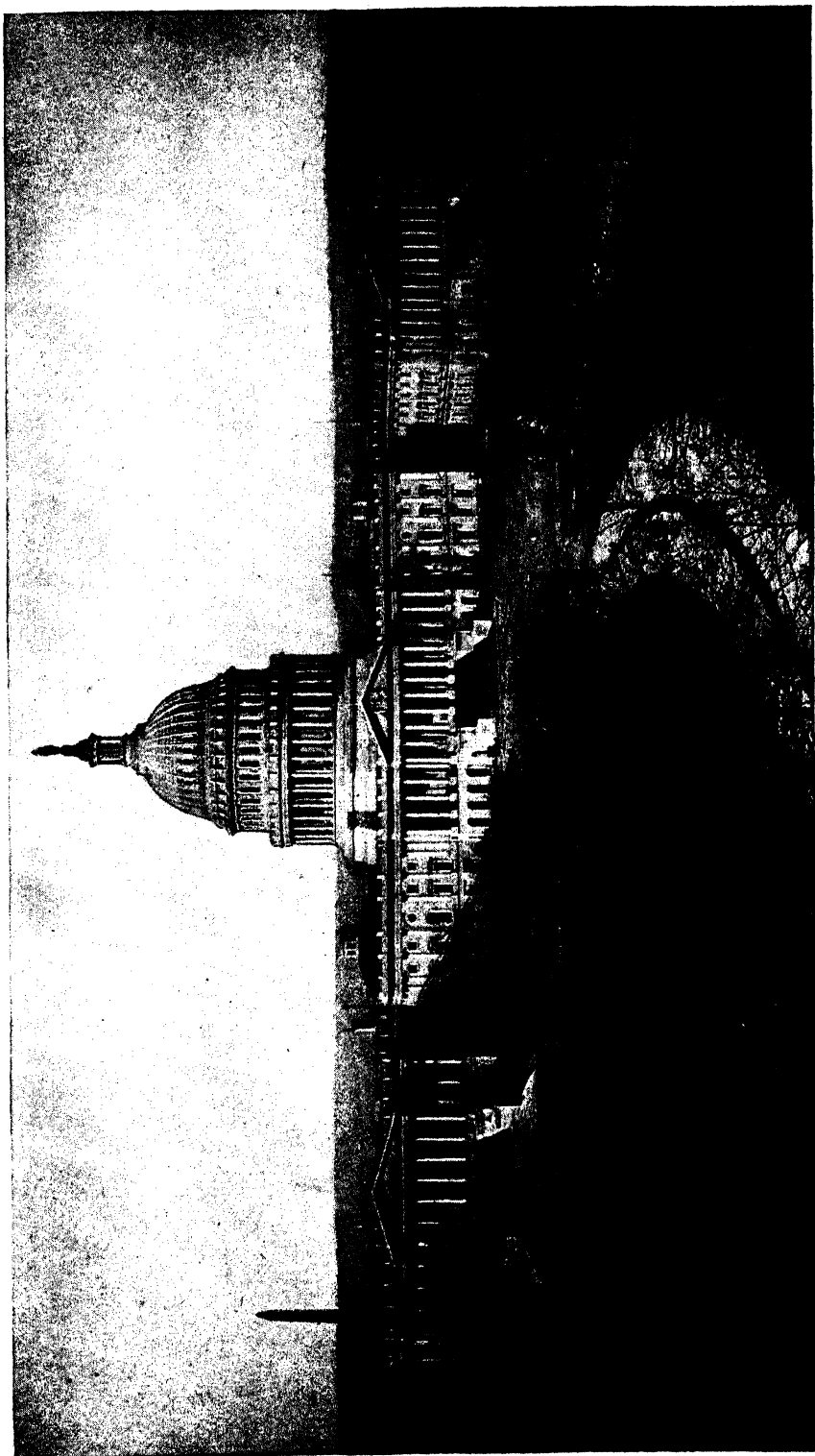
We visit the President's Room with its quiet richness of decoration; we see the Senators' Reception Room, known as the Marble Room because it is constructed wholly of that material, with stately Corinthian columns of Italian marble, paneled walls of Tennessee marble and wonderful ceiling of marble from Vermont. We inspect the Public Reception Room, a richly furnished apartment, glowing with brilliant colors and having a vaulted ceiling with allegorical frescoes depicting War, Peace, Liberty, Plenty, Power, Temperance, Prudence and Justice.

THE MOST BEAUTIFUL LIBRARY IN THE WORLD

We leave the Capitol and walk a little way through its beautiful grounds to the Library of Congress—an impressive marble building, three stories high, surrounded by gardens with broad stretches of greensward and trees.

We enter the Central Stair Hall, a magnificent structure of polished marble. On each side of us rise lofty rounded columns with elaborate capitals of Cor-

WHERE OUR NATION DOES ITS BUSINESS



Here is a picture of the east front of our Capitol at Washington seen over the tree-tops of the Capitol grounds. Note the majestic simplicity and beauty of the building, and the great white dome against the background of the sky. The Capitol is a building of which we have no cause to be ashamed. The Senate wing to the right and the House wing to the left were constructed after the centre portion. People generally see the west front first, as the greater part of the city lies to the west.

inthian design. The lofty arches rise above, exquisitely decorated with marble rosettes, palm leaves and foliated designs of wonderful delicacy. We climb the low broad stairway slowly—pausing now and then to admire one or another of the carved figures in its alcoves. In the entrance pavilion above we see the wonderful series of paintings by H. O. Walker, depicting Lyric Poetry and the Poets' Boys:—Emerson's, Uriel; Wordsworth's, "The Boy of Winander;" Milton's, Comus; Shakespeare's, Adonis; Keats's, Endymion; Tennyson's, Ganymede.

In the South Curtain Corridor are "The Greek Heroes," painted by Walter McEwen. These are nine pictures having for their themes the Greek myths of Paris, Jason, Bellerophon, Orpheus, Perseus, Prometheus, Theseus, Achilles and Hercules. In the Representatives' Reading Room, we find two beautiful mantels showing Law—a woman, radiant faced, enthroned, with Fraud, Discord, and Violence on her left, and Truth, Peace, and Industry upon her right—and History with Tradition and Mythology, one on either side.

The results of good and bad administration are shown in a series of paintings we see in the Reading Room Lobby, while the Evolution of the Book is beautifully pictured in six panels, painted by John W. Alexander. The Family, Religion, Labor, Study, Recreation and Rest, painted by Charles Sprague Pearce, decorate the North Hall. The ones called "The Family" and "Religion" are singularly beautiful, the latter showing two worshipers, a man and a woman, kneeling before a rude stone altar from which ascends the smoke of their sacrifice, and before the rude altar and clustering close about it are some wild growing flowers of the iris plant.

And so we wander on, now inspecting the panels, now some dancing figures of the Muses, now the Graces, now the Sciences and Arts. Two visions of "The Seasons" are seen in the panels by F. W. Benson and the sculpture reliefs by Bela L. Pratt. Which is the most beautiful of these, we hardly know, both so win us by the simplicity and flowing beauty of their lines.

Two lunettes, one of War, and the other of Peace, appear on the walls of the Northwest Gallery of the third floor. War represents a procession returning

from battle with two hounds straining at their leash; then foot-soldiers with spears and bucklers; then the king on his white horse riding over the fallen bodies of the slain, the color bearer, and last of all the wounded borne on litters carried by their companions. In Peace, we see a troop of worshipers bearing a votive offering, the effigy of a goddess in the centre and a boy leading an ox bringing up the rear.

WASHINGTON, THE "CITY OF MAGNIFICENT DISTANCES"

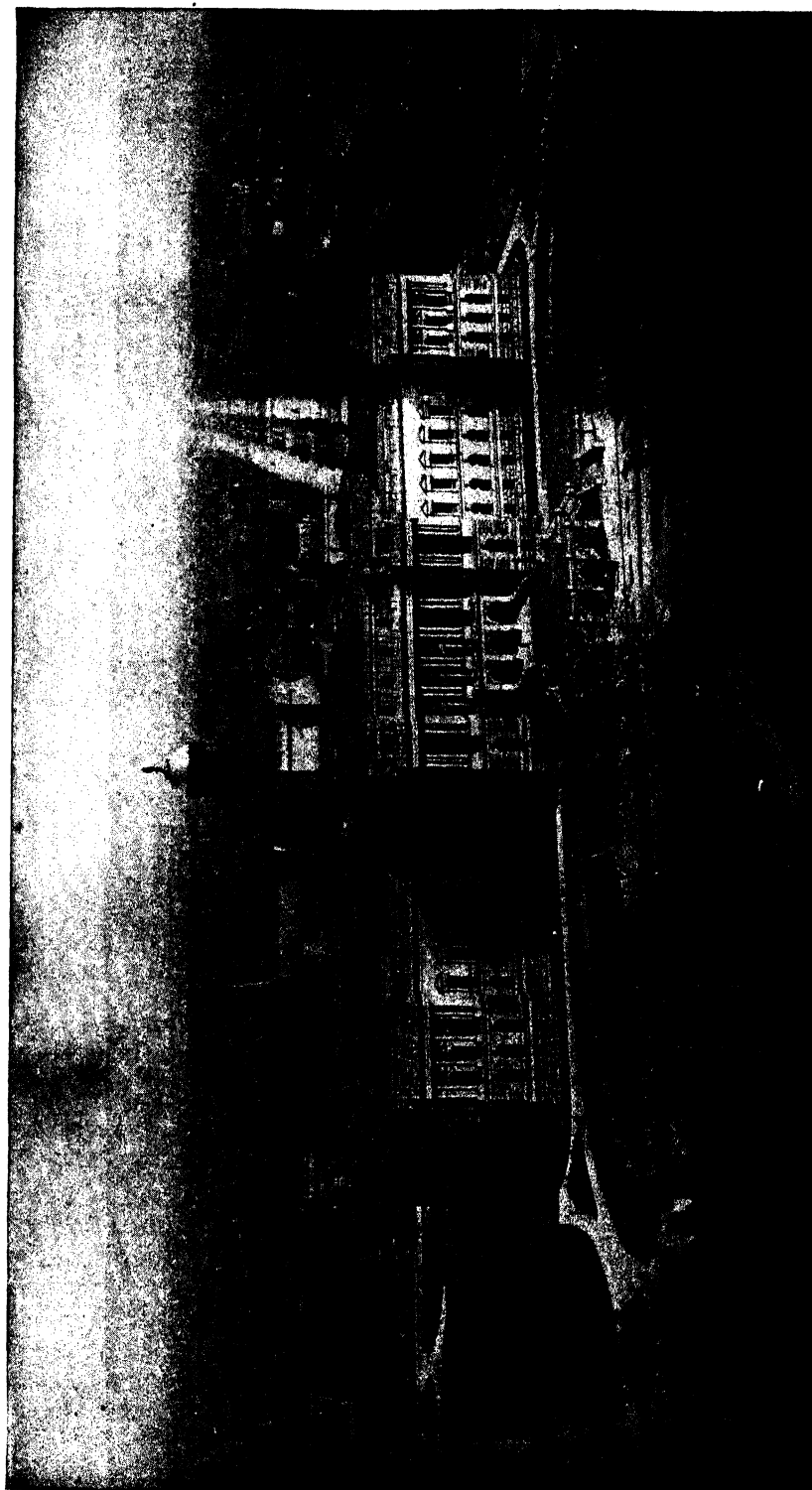
We leave the Library, and driving around the Capitol grounds come out on Pennsylvania Avenue. We are going to the White House. We lean forward in our seats that we may get a better view of the streets through which we are passing. Washington has been called "the City of Magnificent Distances," and it seems a truly beautiful place to us, as we bowl slowly along the mile of the avenue. The avenue is so broad that there is no feeling of being crowded. The street cars in the middle seem to take up scarcely any room. Up the side streets we see trees, trees, trees, and where streets and avenues cross there are so many beautiful little spots of green. "On every side of us there is a picture"—a picture of unruffled tranquillity, of beauty and of prosperity—rare combinations in the national capital of a large country. We think of the changes that have taken place since President Washington first chose this spot upon the banks of the Potomac for the seat of government in 1790. Then it was an untrod wilderness, and as late as 1800, when the Capitol itself had been built, a belle of the times described it as "a town of streets without houses."

WASHINGTON A HUNDRED YEARS AGO

Oliver Wolcott in a letter to his wife says there was at that time "one good Tavern about forty yards from the Capitol, and several other houses and buildings, but I do not perceive how the members of Congress can possibly secure lodgings unless they will consent to live like scholars in a college or monks in a monastery, crowded ten or twenty in one house and utterly secluded from society. The only resource for such as wish to live comfortably will be found in Georgetown, three miles distant over as bad a road in winter as the clay grounds near Hartford."

Gouverneur Morris wrote humorously,

THE GREAT LIBRARY OF CONGRESS



The Library of Congress is one of the most impressive public buildings in the city of Washington. It stands on the edge of the Capitol grounds and the long vista of the city streets beyond gives a very good idea of the way in which the avenues radiate from the Capitol like the spokes of a wheel. All the wonderful decoration, both of painting and sculpture, was done by American artists. The Library of Congress contains one of the largest collections of books and maps to be seen anywhere in the world. Authors, or publishers, must send the Librarian two copies of every book, or periodical, they wish to copyright, that is, to claim as their property.

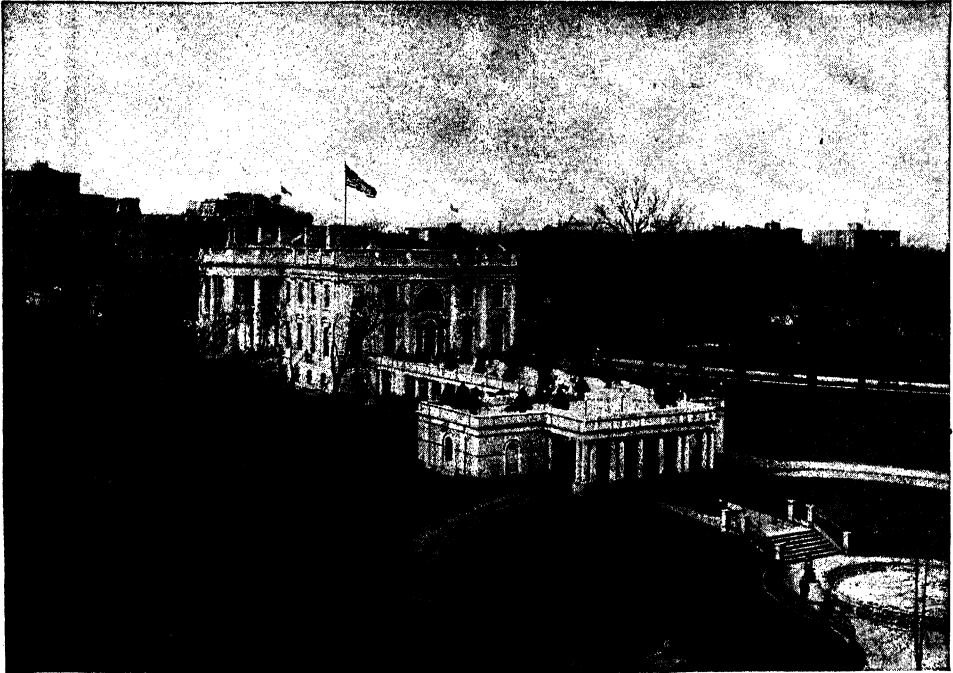
"We want nothing here but houses, cellars, kitchens, well-informed men, amiable women and other trifles to make our city perfect. . . . In short it is the very best city in the world for future residence."

THE HOME OF OUR PRESIDENTS

At last we reach and pass the Treasury Building and see set in a noble park the residence of our Presidents, known to every one as the White House. Wash-

lawn, but they afford room for the President's offices and for entrances into the public rooms, up to that time in the main building.

Let us enter the Public Rooms, which are sometimes open during certain hours of the day. We make our way through a long colonnade on the east end which leads to the basement corridor, where hang the portraits of many of the mistresses of the mansion. Along the walls



THE WHITE HOUSE AT WASHINGTON

Here is a picture of the White House, with one of the new wings built by President Roosevelt during his administration. It is interesting to know that Washington chose the site of the building and that John Adams was the first President to live in the Executive Mansion. It was burned by the British during the War of 1812, but was at once rebuilt. The walls of the building were blackened, but not destroyed.

ington himself selected the place for the White House, and laid the corner-stone in 1792, and lived to see the building completed, though he never occupied it. That honor was reserved for his successor, John Adams, and his wife, Abigail, about whom you may read on another page of our book. The story of its destruction by the British troops has also been told on page 401. But it was soon rebuilt and, except for new coats of dazzling white paint, was little changed until 1902-3 and again in 1909, when additions were built on each side.

These new rooms are only one story high and hardly show above the terraced

are cases in which are bits of historic china or ornaments used in by-gone days. Ascending the broad stairway, we reach the centre hall, from which we may enter the great East Room where the formal receptions are held. This magnificent room is bare of furnishing, but the proportions are so beautiful and the colors so harmonious that we do not realize it.

The other rooms are not usually open to the public, but if we have special permission, the guide may take us into the Blue Room with its hangings of blue silk, and the clock sent to Lafayette by the great Napoleon and by him presented to Washington. The Green Room has green

velvet on the walls and contains portraits of many of the Presidents besides interesting things sent by foreign rulers. The glory of the Red Room is the portrait of Washington by Gilbert Stuart, the picture which was saved by Dolly Madison. In the State Dining Room the formal dinners are given, and a hundred guests may sit down at the massive mahogany table. The private rooms of the President's family are not shown.

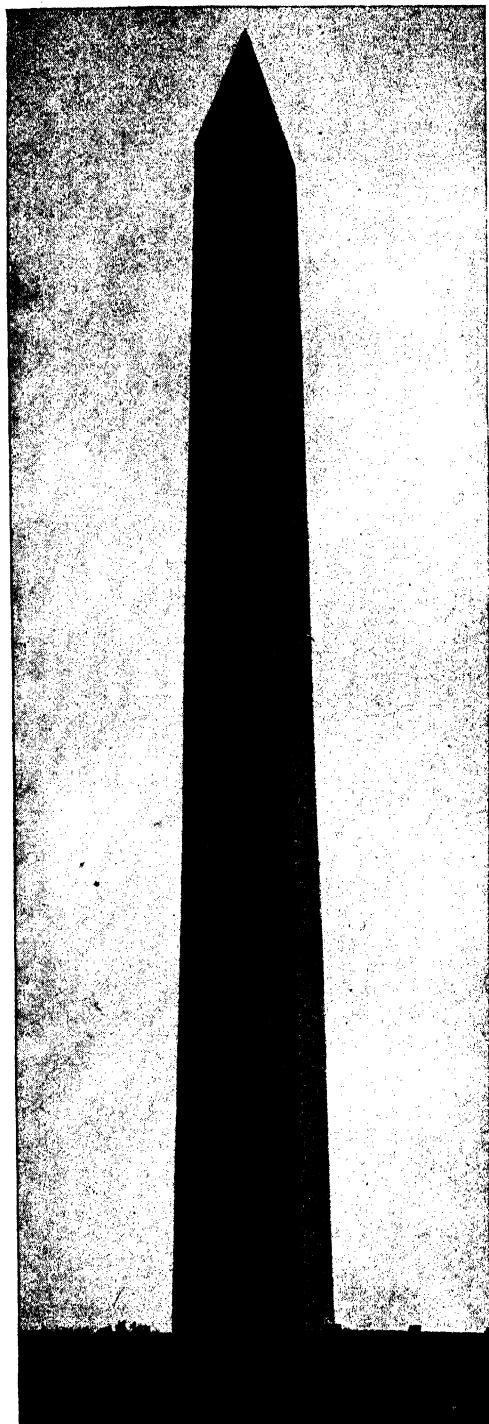
We leave the White House and after a delightful little lunch in a restaurant on Pennsylvania Avenue, we drive back through the Presidential Park, bound for the Washington Monument. Sight-seeing is rather tiresome, however enjoyable, and we gladly settle back among the cushions of our taxi to view comfortably the green, fresh beauty of the public grounds through which we are passing. "The trees! the wonderful quiet majesty and greenness of the trees!" we exclaim with a little sigh of deep content.

THE WONDERFUL TREES OF WASHINGTON

On every side are the rolling lawns and great trees in a glory of summer greenery. A soft midday breeze stirs through the wide-spreading elms on one side and ruffles the leaves of sturdy oaks and sugar maples on another. "No such trees adorn a city anywhere else in America." Each avenue is planted with one variety only. The oaks that line one street are superb. The great horse-chestnuts that bloom on another, offer an ever-growing enjoyment of vista of leaf and flower. The beauty of shrubs, the evergreens, the great magnolias of the South, the symmetrical lawn trees that are profusely used to adorn the circles and the small squares, fills us with a sense of peaceful satisfaction. How the "beauty-hungry souls" of the children of the slums of New York or London would enjoy the streets of Washington! "Green everywhere—just like a park!" we can imagine them exclaiming, wonderingly.

Since 1872 the city of Washington has been systematically planting and controlling the trees under governmental authority and it has spent hundreds of thousands of dollars on this good work.

Suddenly through the trees we catch our first real glimpse of the Washington Monument. How purely it raises its straight shaft into the air, a majestic tapering pyramid of white against the sky.



THE MONUMENT

The Washington Monument was completed in 1885 in memory of George Washington, the Father of Our Country and the first President of the United States. From the little windows in the sloping sides of the top of the monument, a wonderful bird's-eye view of the city of Washington can be obtained.

We descend from our taxi and enter the monument. The interior is lighted by electricity. The elevator carries us nearly to the top, a height of 555 feet. As we slowly rise up the elevator shaft we catch glimpses through the cage of a series of stones—on the landings of the stairway—dedicated to the memory of Washington.

ONE OF THE MOST BEAUTIFUL MONUMENTS IN THE WORLD

There are 170 of these stones—many of them notable for their beautiful and elaborate carving. When we have reached the height of 504 feet we leave the elevator, and step out on a platform. Here the walls are pierced with eight port openings, or windows, two on each side. Through these we get an extensive bird's-eye view of the city. On one side of us stretches the great Parkway of the Presidential Grounds with the Treasury, the State, Navy and War Departments, the White House, and the beautiful monument to President Lincoln in the distance; on another side we see the intervening tree tops, we catch a glimpse of the Smithsonian Institute, the National Museum, and the white gleaming dome of the Capitol; to the south flow the waters of the Potomac between their green winding banks; while yonder to the west lie the wooded slopes of beautiful Arlington, where lies the "Field of the Dead," containing the bodies of many who gave their lives for their country in the Civil War.

From our high far seeing view of the great and singular city spread out at our feet, we realize for the first time how strikingly different Washington is from all our other cities. Not only is it noted for its dignified public structures that house the government's business, for its extensive public parkways of the Mall, the Public Gardens, the Capitol Grounds, and the President's Park, but it is not a city laid out in checker-board fashion as other cities are. The avenues radiate from the Capitol and the Executive Mansion, north and south and east and west, in straight broad lines like the spokes of a great wheel, and here and there, where they cross the streets, are dotted with circles or squares of little parks that break the monotony with spots of rich green. The arrangement is confusing at first, but we soon grow accustomed to it, and can readily find our way.

THE TWO MEN WHO PLANNED OUR CAPITAL

Two names are unbreakably linked with the plan of this great city,—George Washington, the first President of the United States, and Peter Charles L'Enfant, a civil engineer who came to this country about 1777. It was Washington who chose the site of the Federal City upon the banks of the Potomac,—the "river of the meeting of the tribes;" it was L'Enfant who surveyed the ground and designed its plan of construction.

Leaving the monument behind us, we drive through the Agricultural Grounds, where is the building of the Agricultural Department, and crossing the street, we enter the grounds of the great Smithsonian Institute. Through the green screen of the trees we catch glimpses of the red sandstone building of the Institute itself, and of the National, and New National Museums, and of the Medical Museum.

We have only a short time left, and we decide to spend it all in the New National Museum. We enter the building from the park, and turn to the right to reach the great collection of animals, made by President Roosevelt, which is dear to the heart of every child who sees it. Here are many of the animals of which we read in this book. There are bears and lions, antelopes and deer of all sorts, tall giraffes, striped zebras, monkeys of all kinds, and many beautiful birds. From one visit, we cannot attempt to remember them all. There are many other things of interest in the museum. But we can think of nothing to-day but the animals.

We are leaving Washington, our city, the capital of our own dear land. "Washington, above all the cities on the earth, belongs to all the people of a great nation, and not merely to its inhabitants or to a ruler. Through his chosen representatives in Congress, each American voter has an equal share in the actual detail of its government; for, again, Washington alone of American cities is governed, not by its residents, but by the National Legislature." No intelligent American can visit and look upon its beautiful streets and its handsome public buildings without a better realization of the value of his citizenship. "It is our Federal City—the tangible evidence in stone and metal of the great dream of the Father of our Country."

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 1831.

The Story of THE EARTH.

WHAT THIS STORY TELLS US

THE word "chemistry" really means the study of what happens when things are mixed or put together; and the study of the making and unmaking of compounds is all-important, for almost everything that happens on the earth and in living creatures depends upon it. In these pages we learn some of the ways in which the elements unite to make compounds, how these compounds are always made according to a fixed rule, which is really one of the great proofs that the elements are made of atoms, and how all the world over, and in our own bodies, compounds are being made and unmade every moment of our lives. We come now to what seems puzzling at first, but is really simple—the neat and useful way chemists have invented for describing compounds, and the changes that may happen when the chemist adds one to another. These *formulas and equations*, as they are called, are a little difficult at first, but so were the letters of the alphabet once, and almost everything else that is really worth knowing.

THE MAKING OF COMPOUNDS

WE have now said all that need be said about most of the principal elements; but the word chemistry really means mixing, and it is greatly concerned with what happens when different elements are added to each other. If things did not happen when this was done, the world would simply stay almost unchanged from moment to moment, nor could there be any life on it. So the making and unmaking of compounds is really the greater part of the whole study of matter.

What a compound is we already know, nor shall we confuse it with a mere mixture. Sometimes, when the chemist—that is to say, the mixer—mixes two elements, they simply remain mixed, and nothing happens. What is all-important is that very often, when he mixes them or puts them together, they combine with each other and form compounds.

We have studied some compounds already, especially the most important of them all, which is water. But the number of compounds that naturally exist in the world is far beyond anyone's counting, whilst the chemist can make a countless number more which do not exist at all in Nature. Some of these which he makes are extremely valuable to us. Therefore, we must learn all we can about the making of compounds, and also about the unmaking of them, which is equally important. The

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CONTINUED FROM P. 1570



word to describe the making of a compound is, of course, composition, and the word to describe the unmaking of it is decomposition. Almost everywhere these two processes are ceaselessly going on, and the whole life and change of the earth depend upon them.

We can clearly describe a compound, whether it be a very simple one like water or common salt, or whether it be the most complicated compound in the world, like hæmoglobin, the red coloring matter of the blood. A mixture may contain any proportion of the things that make it up—a little of one or a little more, much of another or a little less. It is a quite indefinite thing, but a compound is never so. If it is really a compound it is a perfectly definite thing.

The proportions of nitrogen and oxygen in the air may vary to any extent, for air is a mere mixture. But the proportions of oxygen and hydrogen in the compound water are constant and exact, always and everywhere. Any given compound always contains the same elements in the same proportion, and it is this fact of definite composition that is the mark of any compound. Water always contains eight times as much of oxygen by weight as of hydrogen.

Already we have learned how to understand this, for we know that to make a compound a certain number

of atoms, one or more, of an element must combine with a certain number of atoms of another element—as, for instance, two of hydrogen to one of oxygen to form a molecule of water. There simply cannot be a compound with two and a half atoms of hydrogen to one of oxygen.

THE IMPORTANT DISCOVERY MADE BY A SCHOOLMASTER A HUNDRED YEARS AGO

The history of our knowledge is that this fact of the constant proportion of elements in a compound was discovered first by the Manchester schoolmaster, John Dalton, more than a hundred years ago. It was from this fact and others like it that he argued the existence of atoms which behave as we have seen that they behave.

We can understand the argument best by looking again at water. We call it H_2O , and we know that that means hydrogen two atoms, and oxygen one atom. But in this case, as in hosts of others, the two elements can form more than one compound with each other. There is, for instance, a compound looking rather like water, but really very different, which has two atoms of oxygen to two of hydrogen in each molecule, and therefore must be written H_2O_2 .

We know that this is so because, when we split this compound up, we find that any given quantity of it always contains twice as much oxygen as there is in water. That can only mean that the compound has the composition we have said—that it is made of molecules each of which contains twice as much oxygen as the molecule of water. But we never find any compound which contains one and a half times or two and a half times as much oxygen as in water. So long as oxygen and hydrogen are made of atoms that could never happen.

THE ELEMENTS NEVER MIX TOGETHER IN FRACTIONS OF ATOMS

Nitrogen and oxygen supply still better instances. They actually form five compounds with each other. When we weigh out the amount of nitrogen and oxygen in each of these, the proportions are always very simple. One of them always contains just twice as much oxygen as another. Another of them contains three doses of oxygen to two of nitrogen, and another five of oxygen to two of nitrogen. But you see it is always three or five or two,

never nearly five or a little more than three. Nowadays, then, we can say exactly how these compounds are made. It is simply a question of the number of atoms of the two elements in the molecule of the compound. We need not trouble about the names, but here are the five compounds, all in a row: NO , N_2O , NO_2 , N_2O_3 , N_2O_5 .

One of these you may, perhaps, know very well, and that is N_2O , for this compound is laughing-gas, which the dentist uses to kill—for a little while—our sense of pain.

This is the best instance I know to show that when elements combine with each other, they always must combine in simple proportions; and if they form more compounds than one with each other, then the various proportions are simple multiples of each other. It is either a case of two parts to one, or of one part to one, or of three parts to one, or of three parts to two, or something of the sort; but fractions never—never halves or quarters, or anything at all but whole parts.

A DISCOVERY THAT WILL MAKE JOHN DALTON'S NAME LAST FOR EVER

This great law, from which Dalton learned the existence of atoms, and the way in which compounds are made, has been known all over the world for a hundred years as the law of multiple proportions. It can only have one meaning—namely, that compounds are made of molecules with a definite number of atoms of each compound.

Wherever you find a specimen of, shall we say, N_2O_5 , there, if you split it up, you will find the exact proportions by weight of nitrogen and oxygen, which can only mean that this compound must be made of molecules; every one of which consists of exactly two atoms of nitrogen and five of oxygen. If there were no such things as atoms, the elements could not behave in this way; therefore there must be atoms, and there are. That was the great argument and the great discovery which will make the name of Dalton last as long as time.

If we call the weight of the atom of hydrogen one, then the atom of nitrogen is fourteen, and the atom of oxygen sixteen. So in thirty ounces of NO , you will always find exactly fourteen ounces of nitrogen and sixteen of oxygen; and the proportions by weight in the

other compounds you can easily reckon for yourself if you remember the composition of the one you require.

WHAT A FORMULA IS, AND HOW IT BRINGS A PICTURE TO THE CHEMIST'S MIND

Names like H_2O , NO , CO_2 , and so on, are called *formulas*. Each of them is the formula of the thing it describes. That is not a very difficult word, and it is used every day in chemistry. After this, we shall be able to talk about the formula of water, the formula of carbon dioxide, or anything else we please. When you look at a chemical formula like H_2O , and compare it with what you find when you decompose water, and notice the proportions of hydrogen and oxygen in it, you find that the formula exactly expresses to anyone who understands it, in very little space, the fact that in water everywhere are eight parts of oxygen by weight to one of hydrogen. An atom of oxygen is sixteen times as heavy as one of hydrogen.

Now we must look at a few of the ways in which compounds may be made. The simplest we know quite well already. It is *direct union* of the elements that make the compound. We know it in the case of burning or combustion; and when we use these words we usually mean that, in the course of this direct union, some light is given out. When hydrogen unites with oxygen to form water, it gives a dim blue flame which is intensely hot. But compounds may be made by burning with other things besides oxygen. Hydrogen, for instance, burns with a pale green flame in the gas called chlorine, and produces what we call hydrochloric acid, which has the formula HCl . Our study of the compound common salt, or NaCl , will tell us exactly what HCl means. Then copper can similarly be burnt in sulphur vapor, and so can iron.

THE CURIOUS BEHAVIOR OF SOME COMPOUNDS IN HEAT AND LIGHT

Another very common way of forming compounds is by making one element turn out another from a compound, and take its place. For instance, we can form the compound water by acting upon the compound of some element with oxygen by means of hydrogen. The hydrogen turns out the other element and takes its place with the oxygen, forming the compound water; or, to

take another instance, if we take an element like zinc, and add it to hydrochloric acid, it turns out the hydrogen and takes its place, and we have the new compound formed, zinc chloride—the chloride of zinc instead of the chloride of hydrogen.

Then we can often make compounds by simply heating other compounds. Often a very complicated compound will break up, when it is heated, into two or more compounds that are less complicated; or we may just drive away a certain proportion of one of the elements in the compound, and so we may get something new. For instance, if we heat the peculiar compound which has the formula H_2O_2 , we drive away exactly half its oxygen, and that is one way of making our very old friend, the compound water. Indeed, if you want to keep a specimen of H_2O_2 , you have to keep it cool and away from the light; nor must you let anything that likes oxygen get near it, or that thing will certainly help itself to half the oxygen of H_2O_2 , and leave only H_2O behind.

HOW COMPOUNDS PLAY THE GAME OF EXCHANGING PARTNERS

One of the special uses of H_2O_2 and of some other things like it, is that they very readily give up oxygen to almost any sort of unpleasant stuff which we want to get rid of, perhaps because it has a bad smell, and so change it into something harmless.

You will say that, after all, there is plenty of oxygen in the air, and why should it be necessary to use H_2O_2 to give oxygen to things? The answer is that when oxygen leaves one of its compounds—and this is true of all the elements as well as oxygen—it is much more active and powerful than when it is in its ordinary state. This has been explained already.

Yet another way of making compounds is perhaps the commonest of all; and we must understand it. It has the rather long name of *double decomposition*, but is quite simple really. If we mix two compounds, it often happens that they exchange partners. That is all. Anyone who plays games knows what exchanging partners means; and when that happens in chemistry we call it double decomposition. Of this there are thousands of instances, as when we

take the two pairs, one made of oxygen and mercury, and the other of chlorine and hydrogen. They exchange partners, the mercury takes the chlorine, and the hydrogen takes the oxygen, so that we have mercury chloride and water. That is a good instance of a double decomposition, and it teaches us something.

THE PARTNERS THAT ARE FOND OF EACH OTHER COME TOGETHER IN THE GAME

For we may say in general that, whenever chemical changes like this occur, there is a certain bias, or tendency, in their direction. Some compounds are strongly united, and others weakly united; and the tendency always is to form the compounds that are strongly united. Do you not think that, in exchanging partners in a game, the people who are fondest of each other are very apt to get together? If you have not noticed that, I am sure I have.

Now, that is the rule in chemical changes, and especially in double decomposition. If the chemist knows what compounds are strong and what compounds are weak, if he knows which elements are specially fond of other elements, then he can usually foretell what will happen when he mixes two compounds. Of course, nothing may happen. The partners in the two compounds may be so pleased with each other, so to say, that they will not change. Indeed, a double decomposition will often go in one direction, but cannot be persuaded to go backwards.

HOW TWO CLEAR LIQUIDS MIX TOGETHER AND MAKE A BRIGHT COLOR

Now, in this instance we have given, we notice that water is one of the things that is made. We know that water is one of the strongest compounds in the world. Oxygen and hydrogen are never better pleased, so to say, than when they are together. This is a case where "three is company"—three atoms. Thus, in a double decomposition, if there is any chance of forming water, we may be quite certain that water will be formed, and that the other partners, whatever they are, will probably have to join company whether they are very fond of each other or do not care at all.

Another thing is to be noticed. As a rule, in a double decomposition, anything that is solid—that will not melt in water—is specially apt to be formed.

If water is formed also, then this thing appears as something suspended in the water. After a time it settles to the bottom, and then, by pouring the water off or filtering, we can get the new thing by itself. So it is the commonest thing in the world for a chemist to take two clear liquids—each of which may be colorless, perhaps—add one to the other, and then, in an instant, there may appear perhaps a bright red or brilliant white cloud, which is the new thing formed by the double decomposition that occurred. In the case we have mentioned the mercury chloride is white, but cannot be dissolved in water. If we allow the water to evaporate, then we get the white salt by itself. It is an intensely poisonous but very valuable substance, and this is one of the ways of making it by double decomposition.

WHAT THE CHEMISTS FOUND IN LOOKING FOR SOMETHING TO MAKE GOLD

It very often happens, in double decomposition and in other cases, that a solid is produced in a fluid, and gradually falls to the bottom; and we have a special word for what happens then. We all know what a precipice is. It is a place where the land falls suddenly, and if a man, or anything else, falls over it we say that he was precipitated. Now, when a solid is formed in a fluid, and falls to the bottom, we always say that it is precipitated, although it usually falls very slowly, and sometimes does not fall at all, but hangs in the fluid; and the solid which forms and usually falls is called a precipitate.

It is a long and rather clumsy word, but it was used many centuries ago by the old founders of chemistry, when they were looking for the thing which should make us all young again, and for the other thing which was to turn everything it touched into gold. They did not find either of those things, but they noticed a great many facts, and named them, usually with rather fanciful names. One particular thing formed in the way we have described is called white precipitate. It is highly poisonous, but very useful to apply to the skin when little creatures that should not be there are living on it. It is poisonous to them, and that is what we want. Then there is red precipitate, and so on. After this, we shall understand what we mean when we say

that something is precipitated. Nowadays chemists often turn the same idea into English, and say instead that in certain chemical operations such and such a compound is thrown down or thrown out. "Thrown out" rather expresses the idea, as if the new compound were thrown out by the water which declined to hold and hide it, as it does when it dissolves a lump of sugar.

THE SIGNS USED BY CHEMISTS TO SHOW WHAT HAPPENS TO THE COMPOUNDS

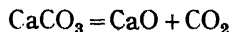
Now, one of the special uses of formulas in chemistry is that they allow us to write, in a very short and neat way, an account of what happens when a chemical change goes on. This change is called a reaction. We say that, for instance, when hydrochloric acid is added to sodium carbonate, there is a reaction. Certain conditions must be present, of course. For instance, scarcely any chemical reaction will occur at the temperature of frozen air. Many chemical reactions require much heat to be used, and so on. These things cannot be expressed in the way we are now going to study, but that way does express what happens, and it does so exactly.

We know that the sign $=$ means *equals*, and we know that the sign $+$ means *added*. So if we write $2 + 3 = 5$, we call that an *equation*, for it states that certain things added together are equal to something else. Now, in rather the same way, it is possible to write a chemical equation; and in the study of chemistry all the world over these equations are used many times every day. The sign $=$, when used in a chemical equation, means that the things on the left of it are turned into the things written on the right of it when the change comes about.

THE STORY OF GREAT HAPPENINGS TOLD BY $\text{CaCO}_3 = \text{CaO} + \text{CO}_2$

These equations may be very simple or very complicated. Let us take a very simple one to start with. We all know what marble is, and we all know what chalk is. These two things, and many others, are made of calcium carbonate. The Latin name for chalk is *calx*, from which chemists have derived the name of *calcium* for the chief element in chalk. The letters for *calcium* are Ca. Now, the formula of calcium carbonate is

CaCO_3 . If this is heated, it is decomposed and split up into two new compounds. One of them is called quicklime; it has the formula CaO , which shows us that it is an oxide of calcium; the other substance that is formed is our old friend carbon dioxide, CO_2 . Now all this can be said in a line of what we call a chemical equation:



Now, the question in every case like this is whether the equation is a real one or a sham one, and that is easy to test. The "equation" $2 + 3 = 6$ is a sham one, for the very good reason that there is more on one side of it than is accounted for on the other side. In every chemical equation, as in every other kind of equation, we must be sure that everything stated on one side is fully accounted for, and no more, on the other side. If that is so, the equation is a real equation. It does not follow that the change which the equation describes happens, for something quite different may happen. But at least it might happen.

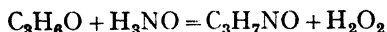
NOTHING COMES FROM NOTHING, AND NOTHING IS MADE INTO NOTHING

On the other hand, we know that if there is something on one side of what pretends to be an equation that is not accounted for on the other side, then certainly what that equation describes does not happen. If it did, it would mean either that some atoms came into existence out of nothing, or that some atoms were destroyed and made into nothing. Now we know that nothing comes from nothing, and that nothing is made into nothing. Everything must be accounted for, where it has gone to, and where it comes from. If we can account for it, we may or may not be right, but if we cannot do so, we are certainly wrong.

So we must look at our equation, and carefully count the atoms of various kinds, on one side and on the other, and we must see that they exactly correspond, both in number and in kind. It will not do if, in place of an oxygen atom on one side, there is a carbon atom on the other. There must be as many of each kind of atom on one side of the equation as on the other, or it is false. The true test whether we understand a

chemical reaction is whether we can write a true equation of it. As long as we fail to do this, we do not understand the reaction.

Now will you please count the equation given on previous page, and say whether it is true or false? You will find that there is one calcium atom on each side, one carbon atom on each side, and three oxygen atoms on each side. It is a true equation; it fully and truly describes what it is that happens when we heat marble or chalk; it accounts for all the atoms that are engaged, and for no more. Here is another equation:



It does not in the least matter whether these compounds exist, nor whether you know their names. But suppose they exist, I want to know whether that reaction happens. Will you please find out before you read any further?

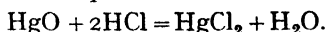
I know the answer you have decided upon; but suppose, instead of H_2O_2 at the end of the equation, we wrote simply H_2O —that is to say, instead of hydrogen peroxide, simply water.

THE BIG 2 AND THE LITTLE 2 AND THE DIFFERENCE BETWEEN THEM

Now, is it possible that that reaction might happen? As a matter of fact, the one of these two that can happen does happen, and it is a simple reaction compared with some, which would take many lines of this book to write.

Now let us take an instance of an equation that describes a double decomposition, and we may as well take one that has been already mentioned.

All we need to know is that the letters for mercury are Hg. The Latin name for mercury is *hydrargyrum*, which simply means water-silver, for that is what it looks like. But we cannot take H for mercury, since that has been used up already for hydrogen, so we take Hg. Here is the equation:



This is the equation that describes what happens when hydrochloric acid is added to mercury oxide. The oxygen and the chlorine change partners, so that we get mercury chloride and hydrogen oxide, which is water. This equation, of course, you must test. There is something new about it not seen in any equation we

have had yet, and this must be explained, because it has to occur in almost all chemical equations. The big 2 in the first half of the equation has not the same meaning as the little 2's which we are so familiar with in the case of water. The big 2 means that in order to make the equation true, we must take two molecules of hydrochloric acid to add to one molecule of mercury oxide.

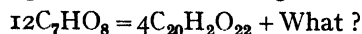
A SIMPLE RULE THAT HELPS US TO REMEMBER AND UNDERSTAND

That is so. We have to take the quantities of these two substances that the equation expresses if we want to get a complete result that changes the whole of both substances we start with. So, of course, it means that the big 2 applies to the whole of what is written after it, as if it were written $2(\text{HCl})$, or H_2Cl_2 . This means that on the left-hand side of the equation we have to reckon with *two* atoms of hydrogen and *two* atoms of chlorine. Remembering that, perhaps you will now test the equation and see whether it is a real one.

The simple rule to remember is that the little figures written after a letter mean so many atoms of what that letter stands for. If there is no figure after a letter, that means that it is just one atom—we do not take the trouble to write the figure 1. But a big figure written before the formula of a compound means that we are taking a molecule of that compound so many times over, and so, if we write $3\text{Na}_2\text{CO}_3$, we have really *six* atoms of Na, *three* of C, and *nine* of O to account for on the other side of the equation.

PRACTISE WRITING DOWN EQUATIONS FOR YOURSELF AND TESTING THEM

This is not really difficult, and it is quite necessary to understand. You can practise writing equations on a piece of paper and testing them. Take any letters you please, and imagine any kinds of compounds. Let us imagine one:



Suppose that this happened, and that just one other compound were required to complete the equation, what would it be, and how many molecules of it would you require? After all, it is only a new kind of sum.

THE NEXT STORY OF THE EARTH BEGINS ON 1813.



THE FORBIDDEN ROOM

THERE was once a magician who took the form of a beggar and went from house to house stealing all the prettiest girls, none of whom ever came back again.

One day he begged for scraps of food at the door of a man who had three very pretty daughters, and the eldest one gave him bread. When she was not looking he touched her arm, and against her will she found herself compelled to jump into his basket. Then he took her to his house in the middle of a thick forest, where everything was magnificent, and she had all that she could possibly desire.

After some days he told her that he was going on a journey, and handed to her the keys of the house, saying that she could go into all the rooms except one. If she entered that room, she would die. At the same time he gave her an egg, and told her to be very careful not to lose it.

No sooner was he out of sight, than, still holding the egg he had given her in her hand, she went all over the house, and found the rooms filled with lovely things. At last she came to the door of the forbidden room, and, after hesitating for a while, her curiosity got the better of her, and she went in. To her astonishment, she found there a number of girls imprisoned by the magician. They lay as if asleep, and, frightened by their stillness, she fled from the room and rushed away.

In her terror she dropped the egg.

It did not break, but when she picked it up she found that it was smeared with red, and, in spite of all her attempts, she could not clean it.

A few hours later the man returned, and asked at once for the keys and the egg. When he saw the red mark on the egg, he knew that she had been into the forbidden room. Throwing her on the ground, he dragged her back into the secret chamber, and imprisoned her with the others.

He then set off again to the house where he had begged, and this time he captured the second daughter. She, too, yielded to curiosity, and met with the same fate as her sister.

The wizard then captured and brought away the remaining sister; but this one was very cunning, and when, in her turn, she received the keys and the egg before the man went out, she at once put away the egg carefully in a cupboard. Then she took the key and went into the forbidden room to see what it contained.

Here she was astonished to see the floor covered with girls fast asleep, among them her two sisters. But, being wiser than the others, she took care of the egg and kept it clean. When the wizard came home, she ran to him with the keys and the egg, and seeing that the egg was clean, he exclaimed, "You shall be my wife; for you have stood the test well."

But the magician was now no longer able to do as he liked, for his

CONTINUED FROM 1534

bride had broken his power and was able to do with him whatever she would. So she went into the forbidden room and awakened the sleeping prisoners, who had been held bound by the wizard's spell. Then she said to him :

"Before I marry you, you must carry a basketful of gold to my parents."

Taking a very large basket, she put her

his basket. While he was on his journey his intended bride took a painted head, decorated it with flowers, and placed it at an upstairs window, as if it were someone looking out. Then she set free all the wizard's victims, and sent out invitations to the wedding. Next she covered herself with feathers, so that she looked like some queer bird, and no one could recognize



In her disguise, the magician's bride met the guests, who said, "Fairy bird, from whence do you stray?"

two sisters into it and covered them over with gold coins. Next she told the man to carry the basket, and not to stop anywhere, as she would certainly watch him from her little window. The man put the basket on his shoulder and started, but found it so heavy that he was ready to drop with fatigue. So he sat down to rest; but instantly a voice from the basket said, "I am watching from my little window." Thinking it was his future wife calling after him, he started up and struggled on. Every time he tried to rest, the same thing happened, and at last he reached the parents' house, where he left

her. After this she started from the house and met some of the guests, who said :

"Fairy bird, from whence do you stray?"

"I came from the fairy's home this day."

"And what has become of the young bride, say?"

"She has garnished the house all in and out, And now at the window she's looking out."

When the wizard returned, he looked up and saw the head at the window, and, thinking it was his future wife, went into the house. At once the friends of the three sisters, who had come to revenge their wrongs, locked the doors, and set the house on fire. And that was the end of the wizard and his forbidden room.

THE STORY OF LADY ANNE GRIMSTON

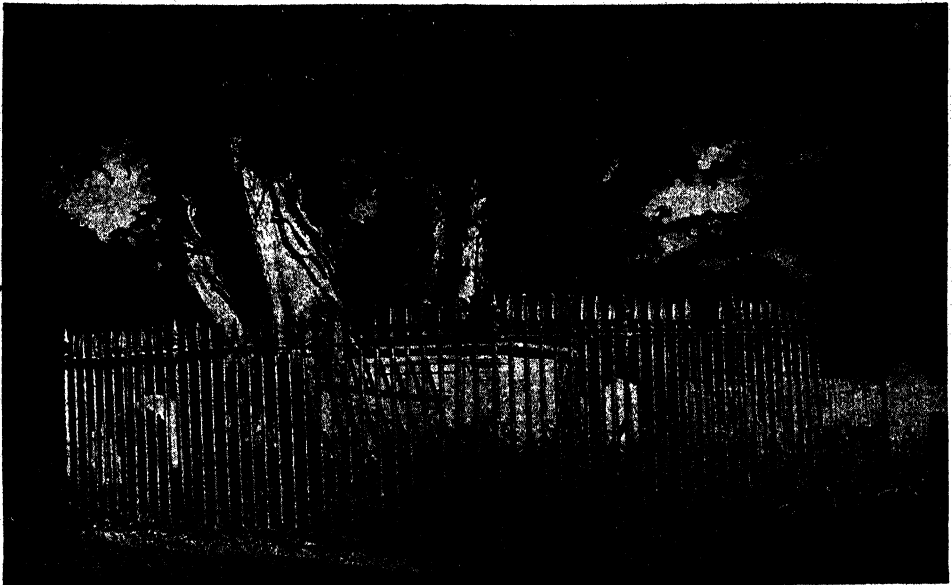
IN a great house in Hertfordshire Lady Anne Grimston lay dying.

She was a proud and obstinate woman, who had enjoyed her riches, her lands and the society of her friends while she lived, and had cared nothing for the more important things which do not pass away. And she died as she had lived, with none of the comfort that comes to all good men and women when they leave their friends and pass out of this world.

She believed that when she had passed away from her friends, when her houses, and riches, and lands were gone, she herself, and the life that was in her,

—buried and forgotten. But not quite forgotten; for one day, many years after, the marble slab over her grave was found to have moved from its position. The builders fixed it firmly in its place again, and left it, thinking it quite secure.

Again the heavy marble slab tilted slightly on one side, and in the middle was a crack, with a tiny bunch of leaves bursting through. The crack was closed with cement and the slab put back again; but again the slab was lifted up, the crack opened wider than ever, and the thin trunk of a tree appeared. They repaired the crumbling tomb, and built around it tall iron railings to hold the



GREAT TREES GROWING OUT OF THE GRAVE OF LADY ANNE GRIMSTON IN TEWIN CHURCHYARD

would be gone, too, gone for ever, utterly destroyed. Her friends tried to point out to her how terrible and impossible this was, how certain it was that she would live again, as the roses live again. Just as the trees and flowers in the field live again after their long sleep, so, said her friends to Lady Anne Grimston, she, too, would live again, and the life that was in her would never end.

But Lady Anne Grimston was proud and unbelieving, and she said to her friends, "I shall not live again. It is as unlikely that I shall live again as that a tree will grow out of my body." Lady Anne Grimston died, and was buried in a strong tomb made of marble

masonry together; but the young tree made its way, breaking the masonry in two, destroying the walls of the tomb, and tearing the heavy iron railings out of the ground.

And to-day, growing right from the heart of Lady Anne Grimston's grave, in Tewin churchyard, half an hour's ride from King's Cross Station, is one of the biggest trees in England, four trees growing from one root. The heavy iron railings are fast through the trunk of the tree and cannot be moved, the marble masonry of the tomb is shattered to pieces, and to-day Lady Anne Grimston's grave is a heap of broken stone and twisted iron bars.

THE MAN WHO MIGHT HAVE BEEN KING



William Tell, seen here with his little son, was arrested for refusing to bow to a tyrant set over the Swiss people by their Austrian conquerors. He was offered his freedom if he would shoot an arrow at an apple placed on the head of his little boy, which he did. Though arrested again, he escaped, killed the tyrant, and freed the country. They would have made him king, but he went back to his home in the mountains.

THE STORY OF BRAVE WILLIAM TELL

THE MAN WHO FACED A TYRANT

THERE walked one fair day across the market square of Altdorf, in Switzerland, as fine a looking man as one could wish to see. Tall and straight, broad and shapely, with ruddy, bearded face and proudly-held head, this man of the mountains strode with clean, swinging stride across the square, with a look of bright happiness in his eyes, and a cheerful word of greeting for his friends. Many turned to say, "There goes William Tell, the crossbowman of Bürglen."

This man, who was said to be the finest crossbowman in Switzerland, and the best handler of a boat on the storm-swept lake of Uri, lived quietly in a mountain cottage, with a wife who shared every thought of his heart, and children for whom it was his delight to work. He hunted deer in the mountains, and went fishing on the lake. His children never lacked good food and clothing. His home was trim and neat. There was no family in that district more firmly established in peace and contentment.

Tell had sold the pack of deerskins which he had brought with him to Altdorf. He was on his way now to buy winter clothing of warm wool for his children. He had money, enough and to spare, and he was in a mood of great happiness. In an hour or more he would be singing a song on the road to his mountain home. Suddenly he felt his arm seized, and found himself in the grip of an Austrian soldier. In another instant he was surrounded. The soldier who had seized his arm pointed to a pole with ducal cap on the top. "It is death not to bow to that cap, and you know it!" said the soldier.

A silence fell upon the whole square. People left off their trading and crowded round the group. A thing greater than trade was at stake now—a man's freedom, a nation's liberty. William Tell had flushed a deeper red. He brought his eyes from the cap on the pole to the soldier's face. "I have done nothing unlawful," he said slowly.

"You have insulted the majesty of the Duke!" said the soldier.

William Tell kept a steady eye. "Why," said he, "should a man show more reverence to an empty cap than

to any empty cloak or a pair of hose?" At this there came from behind the soldiers the figure of the Governor of the district, the tyrant Gessler. It was this Gessler who, set over the once free Swiss by their conqueror and oppressor, the Duke of Austria, had trodden liberty under foot, had murdered and imprisoned all who stood against him, and, as a last barbarity, had declared that everyone who did not do homage to the badge of Austrian rule set up on the pole in their market-place should die. William Tell faced the Governor. He feared no man. No one could break his proud spirit. In his mountain he had brooded upon the shame of the slavery which enchained his country, and had already spoken with his friends of resistance. Never, never, would he do homage to the hated badge of the tyrant's mastery.

"So you would make a jest of the sign of majesty?" asked the Governor, approaching him, while the soldiers saluted. At that moment there came from the crowd a child's cry of "Father! Father!" The crowd turned about, opened out, and presently William Tell's little son, who had come without leave to the fair, was rushing to his father. The Governor caught the boy's arm. "Is this the brave traitor's son?" he asked.

"Hurt him not," said Tell. "He is my firstborn."

"Oh, I won't hurt him!" answered the terrible Gessler. "If any harm should come to him, it will not be by me, but—by you." A horrible smile lighted his eyes. "Here," said he to a soldier, "take the boy and tie him to the trunk of that linden-tree over there, and place an apple on his head."

"What is this for?" demanded Tell.

"I am told that you are called the crossbowman of Bürglen," replied the Governor, "and I should like you to give me an exhibition of your skill. Your life is forfeit. But I am in a merciful mood; I will give you a chance of redeeming it. Come, listen to me. If at this distance you can shoot an arrow so as to split the apple on the curls of your firstborn, I will let you go free. If not—if you miss the apple, or kill your child—I will execute you, here and now."

"Have you no mercy?" cried Tell, trembling with indignation. "And do you think I will attempt to save my own life at the risk of my son's?"

"I am doing you a favor," replied Gessler. "Think. By a lucky shot you may save your life, and go home!"

Tell held out a hand which was trembling. "How can a man who loves his son aim with a steady hand an inch above his temples? Ah, look at the child! My lord, look at him! He is no kin of yours; you know nothing of the pretty ways by which he has climbed into a father's heart, the innocence of his eyes, the beauty of his face! Am I to risk that life?"

Gessler laughed brutally. "Well, you either shoot an arrow, or die."

"Then I will die."

"And first your child shall have his neck wrung before your eyes!"

A blinding passion of indignation overswept the noble soul of the mountaineer. "Give me the bow," he said. "One thing in mercy I ask. Let the child's face be turned away from me. Let me not see his eyes fixed upon me."

A way was cleared between father and son. A dense multitude stood on either side. The boy, with his face to the tree, bound by ropes to its trunk, felt the apple weigh like lead upon his head. A dreadful silence fell upon the market square. William Tell chose two arrows. One he thrust in his girdle; one he fitted to his bow-string. Then for a moment he stood, a little bowed of shoulder, with his eyes downward; he was praying. You might have heard a leaf fall, so still was the place. Then Tell raised his head; his eyes were steady; his hands had become still; his face was like iron. He brought the crossbow to his shoulder and laid his eye to the feather of the shaft. *Twang!*

The arrow shot forward, and, as it were at the same moment, buried itself deep in the tree. The apple fell in equal parts on either side of the boy's head. A roar of cheering went up to heaven, and Gessler turned to Tell.

"A good shot, traitor!" he said cruelly. "But tell me, for what reason did you take two arrows?"

Tell laid his hands upon the arrow in his girdle. "If the first arrow had hurt my child," he said, "this one by now would be through your heart!"

"Oh! So I run in danger of my life?" said the Governor. "But I will keep the pledge I gave you. You shall not die. I will give you your life. But the rest of that life you will spend in the dungeons of my castle, and your bow-string will not then be a danger to me."

At this Tell was seized again, and rushed by the soldiers through the scowling mob to the quay, where the Governor's ship was moored. But it chanced that as the ship crossed the lake of Uri a storm arose, savage and wild, and it seemed as if everyone would be drowned. The Austrians could not manage the vessel, and began to abandon hope. In their panic they remembered that Tell was reputed the best sailor in that part of the world, and spoke to the Governor. "Loose him," said Gessler, "and let him save us." So Tell took the helm, and under his guidance the little ship soon righted herself. But as he headed her for the shore he was thinking, not of Gessler and the Austrian soldiers, but of freedom—freedom for himself and for Switzerland. He would free himself and save his country.

He brought the ship close to a rock that jutted out from the coast, and then, as it shot past, he sprang suddenly upon the rock, and left the Austrians to save themselves. Swift of foot, he scaled the rocks, climbed the cliff, and made his way across the mountains to a place on the road, which Gessler, if he saved himself, would have to pass. Here he lay concealed amongst the bushes, with an arrow fitted to his bow-string, his heart set on delivering Switzerland from the tyrant. As he waited, darkness fell among the mountains. Presently there came to him the tramp of feet. "And if I live to return to Altdorf," Gessler was saying, "I swear I will destroy the whole brood of this traitor Tell, mother and children, all in the same hour!"

"You shall never return!" said Tell to himself. And, as the soldiers went marching on, he let fly the arrow, and Gessler dropped dead in the dust.

William Tell inspired the rising of the Swiss people, which led to the overthrow of the Austrians and made Switzerland a free country.

They would have made him king, but he shook his head, and went back to his home among the mountains, which was more to him than many palaces.

LITTLE STORIES ABOUT FLOWERS

Almost every flower has a story, just as almost every place has a legend. They are "made up," perhaps, as the legends are, but they are often very beautiful.

THE CORNFLOWER

QUEEN LOUISA OF PRUSSIA was a brave, beautiful lady. The great Emperor Napoleon came and conquered her country, and oppressed her people, and she struggled bravely against him.

At last, however, Berlin was captured by the enemy, and she barely managed to escape with her little children and hide in a grain-field. Her children were frightened, and began to cry, and Queen Louisa was afraid that someone might hear them. So she took some of the blue cornflowers and twined the blossoms into wreaths and crowns for them, and in this way made the children forget their sorrow.

One of her children was named Wilhelm, and he afterwards conquered Napoleon's nephew, and was made the first German Emperor, and he took as his emblem the blue cornflower. Now all the German people wear it on festival days, as the emblem of German unity, and as a souvenir of their brave Queen Louisa of Prussia.

THE ENCHANTED THORN

ONE of the thorn-trees at Newlands Corner, in Surrey, is enchanted. Some maidens who danced around it one summer night were carried off by the fairies and never seen again. But a few years later two shepherds were sitting there, when the thorns were white with blossom, and one of them said:

"We'll see if this thorn is really enchanted. I'll dance round it, and you sit and watch what happens."

Instead of dancing in the ordinary way about the tree, however, he danced round it backwards. When he had finished, the earth opened, and a green table came up. On the table were delicate dishes of meat and fish.

"Don't touch it; it is fairy food!" said one of the shepherd boys.

But his daring companion feasted to his heart's content, and the table then sank into the earth. He became one of the richest farmers in England, for the food was lucky food, but his companion to the end of his life remained a shepherd.

THE CHRYSANTHEMUM

IN the Black Forest lived a peasant named Hermann. Going home one Christmas Eve, he saw a little boy lying in the snow. He carried him to his wife and children, who, in their pity, gladly shared with him their little feast.

All night the Guest remained in the hut, and in the morning revealed Himself as the Christ-child, and vanished. When Hermann next passed the place where he had found the Child, wonderful flowers were growing out of the snow. Gathering a handful, he gave them to his wife, who called them chrysanthemums, meaning Christ-flowers, or, more correctly, gold-flowers. Ever after this on Christmas Eve a part of the feast in Hermann's house was set aside for some poor child, in memory of their Guest.

THE ROSE OF JERICHO

THE rose of Jericho is also known as the Resurrection flower, for it is supposed to have the property of dying and coming to life again. Its origin is described in a very pretty legend.

When the infant Jesus fled from Bethlehem with His mother Mary and Joseph, to avoid the massacre of all the young children by King Herod, the party are said to have crossed the plains of Jericho. When Mary alighted from the ass on which she was riding, this little flower sprang up at her feet to greet the infant Savior whom she carried in her arms.

Flowers are said to have thus sprung up at all the places where the Holy Child rested.

All through the Savior's life on earth the little rose of Jericho continued to flourish, but when He died upon the Cross all these flowers withered and died away at the same time. But three days later, our Lord rose again from the tomb, and at the same time the roses of Jericho came to life, and sprang up and blossomed all over the plain as an emblem of the joy of the earth because Christ was risen.

And because of these happenings, the rose of Jericho has ever since borne also the name of the Resurrection flower.

THE UGLY DUCKLING

An old Mother Duck, who was very proud of her handsome family, was much disappointed when a little one was hatched who was so ugly that everybody called him the Ugly Duckling.

"I never imagined," she said to a friend who came to visit her, "that I should ever have such an ugly child. Just look at the others, how pretty they are and how gracefully they move!"

Soon the ducklings grew old enough to have their first swimming lesson.

"Quack, quack!" cried the Mother Duck, and out they all came, as fine a brood of ducklings as any mother could wish to see. And behind them came the Ugly Duckling, alone and forlorn.

"Do you not see your young brother?" said the Mother Duck.

"He can't be our brother," they replied scornfully. "He is so ugly that we can't bear to look at him."

But when they found that he took to the water like a brave young duck should, and beat them all at their games and races, they were jealous of him, and angry that one so inferior in appearance should in any way excel.

One day the Mother Duck took her children to visit some friends in a neighboring farmyard. They had not been there long before the Ugly Duckling found everybody staring at him, and one old duck even flew at him and bit him on the neck.

"You are not like the rest of us," he said. "You are so big and ugly. Why do you come here?"

"Let him alone," said the Mother Duck. "He is not pretty like my other children, but he is good-natured, and he swims better than any of them."

But when the mother's back was turned, the Ugly Duckling had a bad time of it. They all made fun of him, and gave him sharp pecks.

"They all hate me because I am ugly," sighed the Ugly Duckling, "and it is through no fault of mine. I am evidently not wanted. I shall go away."

And so when no one was looking he stole away. On and on he went until he came to a great moor, where he saw a number of wild ducks who came to have a look at the stranger.

"How do you do?" said the Ugly Duckling politely.

But they stared at him for some time without answering, and then one said:

"How ugly you are!" And then they all began to laugh. But just at that moment there came a sound which terrified the poor duckling.

"Pop, pop!" went a gun, and down dropped the wild ducks one by one.

The smoke from the guns blew across the water and choked him, and as it faded away in the air the duckling was terrified to see a huge dog dash into the water and come swimming towards him. He was too frightened to move, but to his surprise the animal, with a sniff, passed him and left him trembling from head to foot with fright.

"I am so ugly that even a dog cannot bear to look at me," he thought, and he shivered and dared not move till the sun had gone down, lest other strange dangers should come upon him.

When morning dawned he caught sight of a little cottage that lay close by. Perhaps it might offer shelter for the poor lost duckling, who felt so helpless in a strange world.

He went up to the door and peeped in. An old woman stood by the hearth, and near by crouched a cat and a hen.

"Perhaps they will not notice how ugly I am, and will let me stay," thought the duckling. And he crept in and waited just inside the doorway.

The cat saw him first, and she began to purr loudly, and the old woman looked round.

The Ugly Duckling held his breath for fear that she should turn him out. But a smile spread over her face.

"How fortunate I am," she exclaimed; "now I shall have some duck's eggs!"

THE UGLY DUCKLING

But the duckling did not present her with any eggs, and after a time the cat and the hen began to quarrel with him.

"I don't know of what use you are in the world," said the hen disdainfully. "You cannot lay eggs like I can; you cannot even purr like the cat, and nobody could call you handsome."

"I think I had better go, before they turn me away," sighed the poor duckling, "but where to go I cannot think."

And so he left the cottage and returned to the water, feeling even more lonely and helpless than before.

That evening at sunset there came out of the bushes a flock of birds, so beautiful and so white that the Ugly Duckling gazed at them in astonishment. They were swans. It was the first time that he had ever seen a swan, and he thought that he had never seen anything so beautiful. They uttered strange cries as they passed, and for some minutes the duckling watched them, admiring their beauty with sad, half-envious feeling.

"How glorious to be so beautiful!" he thought.

But by and by came the winter, with the cold and the ice, and the poor duckling, cold and often hungry, longed for the home that he had left, for, bad as things had seemed, they were far worse now.

Sometimes the air was so cold that he was obliged to keep swimming about to prevent the water from freezing.

Once he was so tired and stiff with the cold that he could scarcely move, and then the pond froze around him, and he would have died if a farmer, who was passing, had not broken the ice with his stick, and rescued him.

The farmer took him home, and warmed and fed him, and the Ugly Duck-

ling thought at last he was among friends. But in the afternoon, when the children came home from school, they ran towards him with cries of joy, and the duckling, thinking they meant to do him harm, flew up, and in his terror fluttered into the meal-tub, scattering the meal far and wide. This made the farmer's wife so angry that she picked up a stick to beat him. But luckily he saw her in time to escape.

Once again the duckling was homeless, and all through the winter he suffered from cold and hunger, until at last came the beautiful spring, with soft, gentle breezes and warm sunshine.

"This is good!" said the duckling. "It makes me feel quite strong."

And on he went until he came to a pond. The pond was as smooth and as clear as a mirror, and in passing the Ugly Duckling looked down at his reflection. He was startled. Surely something was wrong! He looked again, and then he gazed all round, but no creature was in sight. What could it mean? Instead of a big ugly duckling he saw a tall, graceful swan, as beautiful as the birds he had once seen. What had happened? Could it be that he, the Ugly

Duckling, had changed into a beautiful swan?

He looked up, and there he saw, gliding toward him, a number of these beautiful creatures. They greeted him politely, and called him brother. "Come with us," they cried. "You are such a fine fellow, we would have you join us."

And then, lifting up his head, and quivering with excitement and joy, the Ugly Duckling, who no longer deserved his name, proudly followed his fellow swans, with whom he lived happily ever after.



The old woman looked round and a smile spread over her face. "How fortunate I am!" she said.

THE STORY OF THE SLEEPING BEAUTY

ONCE upon a time all the fairies of the country were invited to the christening of a little baby Princess. Seven fairies came, and they acted as godmothers; and a feast was held in their honor. Just as the feast began an ugly old fairy appeared. Nobody had seen her for fifty years, and, thinking that she had left the country, the King and Queen had not troubled to invite her. This made her very angry, and as she sat down she muttered:

"Before I leave this place I will turn all their joy to sorrow."

Happily, the youngest fairy overheard

the threat, and slipped away and hid herself behind a curtain.

When the feast was ended the other fairy godmothers came to the little Princess and gave her their christening gifts. The first fairy bestowed on her the gift of angelic beauty; the second, the gift of angelic goodness; the third gave her the gift of genius; the fourth, the gift of exquisite gracefulness; the fifth endowed her with the utmost sweetness of voice, and the last blessed her with every other gift.

"Hold! See, your gifts are useless!" cried the ugly old fairy. "For I give your godchild the gift of being pricked by a spindle, and of dying from the wound."

The King and Queen began to weep. But the youngest fairy sprang from behind the curtains and said:

"Do not weep, my dear King and Queen. The Princess shall not perish. Yet I cannot change entirely the spell which an older fairy has cast upon her. She will be pricked by a spindle. Yes! But instead of dying she will only fall into a sleep lasting a hundred years, and from that sleep she will be awakened by a kiss."

At once the King made a law forbidding everybody to use a spindle, and the Princess never saw one until she was sixteen years of age. Then, when climbing about one of her father's castles in the country, she came to a garret, and found there a simple old serving-woman spinning flax with a spindle and distaff. The Princess took up the spindle to look at it, the point ran into her hand; and she fell down in a deep sleep. The King and Queen summoned all their doctors,



The Prince strode through the castle gates and found the courtyard covered with horses and soldiers. And over all brooded an awful silence.

but none of them could awaken the Princess. In the meantime the youngest fairy arrived. She bade the King and Queen return to their palace, and leave all their courtiers in the castle. Then she dressed the Princess in a lovely robe and laid her in a golden chamber, and cast a spell upon every living thing in the place. A high, dense thicket of briars, thorns, and brambles at once sprang up around it.

Many persons lost their lives in trying to force a passage through the trees, and at last no one dared to approach it. The King and Queen died without leaving an heir, and a new line of kings began to reign, and in the wars and tumults of a hundred years the story of the Sleeping Princess was forgotten. At the end of that time the son of one of the new kings lost his way while out hunting, and wandered until he came to the Enchanted Castle. He asked who lived in this strange, lonely place. Some replied that it was the haunt of witches; others said it was the dwelling-place of a terrible ogre.

The Prince did not fear danger. He tied his horse to a tree, and, sword in hand, made his way to the castle.

He entered the wood, and the briars and thorns and great trees bent aside to let him pass, and he strode on through the gate of the castle. He found it a place of strange death. The courtyard was covered with the bodies of horses and dogs and soldiers. In the corridors lay waiting-maids and pages, serving-men and messengers, and in the rooms beautiful ladies were stretched beside tall knights and gallant courtiers.

The Prince trembled, but he did not turn back. Still striding on, he opened the door of the Golden Chamber, and there he saw a wonderful sight. In the middle of the chamber stood a great bed hung with rich curtains, and on the bed was a young Princess of angelic loveliness. Surely she lived? He leaned over the Sleeping Beauty to see if she breathed, and touched her lips with his. The Princess opened her eyes.



The Prince opened the door of the Golden Chamber. In the middle stood a great bed, and on it lay a young Princess.

"Is that you, my Prince?" she said. "I have been waiting a long, long time."

They began to tell each other the story of their adventures, but they were soon interrupted. For every living thing in the castle had awakened with the Princess. The dogs barked, the cocks crew, and the soldiers took up their arms. The messengers ran along the corridors with messages given to them a hundred years ago, and upset the trays of the waiting-maids. The courtiers made love to the beautiful ladies, and the maid of honor entered the Golden Chamber and said the dinner cooked a hundred years ago was ready.

Soon after they went to a little chapel in the Enchanted Castle, where they were married, and then set out for the palace of the King, where they were welcomed with wonder and joy.

THE STORY OF THE GOLDEN APPLE

ONE of the goddesses was so mischievous and caused so much trouble that she was named Discord, and Jupiter, king of the gods, drove her from his kingdom. This made her so angry that she determined to be revenged.

At a grand wedding that took place on the earth, when all the goddesses except Discord were present, Discord threw in a golden apple, on which was written, "To the Fairest." Discord knew that this would cause great jealousy; and so it did, for each of the goddesses claimed that she was the most beautiful, and ought, therefore, to have the prize.

At last Juno, Minerva, and Venus were chosen as the most beautiful. There was only one prize, however, and everyone was so afraid of offending these three powerful goddesses that they dared not decide which of the three should have the apple.

It was arranged that a young shepherd named Paris should make the choice, and each of the three goddesses offered Paris a precious gift if he would award her the prize. Juno offered him a kingdom; Minerva offered him great

success in battle; Venus said she would give him the most beautiful woman in the world for his wife.

Paris chose Venus as the fairest. Some say that Venus was chosen because of her famous girdle, which gave to anybody who wore it great beauty and grace. Others say that Paris chose Venus because she promised him the most beautiful wife.

Paris was the son of the King and Queen of Troy, who had cast him off when a baby, but had now called him back to his home. He never forgot Venus's promise, and when he was a brave warrior he heard of the great beauty of Helen, and said to himself, "This is the woman Venus promised me."

So Paris assembled his ships and men, and sailed to the land where Helen lived. There he found Helen, and stole her from her husband and took her back to Troy. Helen's husband, Menelaus, came to Troy with all his princes to fetch Helen away, and for years a terrible war was fought between them. In the end Paris was killed, and Menelaus carried Helen back to her own home in Sparta.

THE STORY OF THE MAGIC CARPET

A SULTAN of India had three handsome sons, and they all fell in love with their pretty cousin, Princess Nourounnihar. One day their father called them together and said:

"You know how fond I am of curious objects? Well, I will grant the hand of the Princess to him who brings me the most wonderful thing."

After arranging to meet at an inn at the end of the year, the three brothers set out on their travels.

Prince Houssain, the eldest, went to Bishnagar, where he saw a Crier offering a carpet for forty purses of gold.

"That's a lot of money for a carpet," he said.

"No, it isn't," said the Crier. "Just sit on it, and wish yourself in some other place."

Prince Houssain sat on the carpet, and wished himself in his house, and, lo! he found himself in his bedroom. So he returned to the Crier, and gave him forty purses of gold for the carpet.

"I'm sure I shall win Nourounnihar with the carpet," he said.

He then wished himself in the inn where he had arranged to meet his brothers, and there waited for them.

Prince Ali, the second brother, went to Shiraz, where he saw a Crier offering a plain ivory tube for forty purses of gold.

"That's a lot of money for a tube," he said.

"No, it isn't," said the Crier. "Just look through it, and wish to see somebody."

Prince Ali looked through it, and wished to see the Princess, and, lo! he saw her sitting with her maids-of-honor in his father's palace. So he gave the Crier forty purses of gold, saying:

"I'm sure I shall win Nourounnihar with this tube."

He hastened to the inn, and there he and Houssain waited for Ahmed.

Prince Ahmed had gone to Samarcand. There he met a Crier who offered him an apple for forty purses of gold.

THE STORY OF THE MAGIC CARPET

"That's a lot of money for an apple," he said.

"No, it isn't," said the Crier. "Just let the man who is dying in the next street smell the apple."

The Prince did so, and the dying man at once recovered his health. After paying the forty purses of gold, Prince Ahmed hastened to the inn and showed his brothers his apple, and they showed him their carpet and tube.

"It's difficult to say which is the most wonderful," said Prince Houssain. "Lend me your tube, Ali."

her," said the Sultan. "I'll tell you how to settle the matter. Take a bow and arrow each, and go into the great plain outside the city. He who shoots his arrow farthest shall marry the Princess."

Crowds came to watch the contest. Houssain sent his arrow a good way; Ali sent his still farther; Prince Ahmed shot so well that his arrow went out of sight! Nobody, however, could find it, so the Sultan decided that Ali had won Nourounnihar.

Prince Ahmed did not grieve long for his pretty cousin. What troubled him



Houssain, looking through the magic tube, saw the Princess. She lay on her bed dying. The brothers jumped on the magic carpet, which carried them to the castle, and Prince Ahmed's magic apple saved her life.

Houssain looked through it, and wished to see Princess Nourounnihar.

"Heavens!" he cried. "What do I see? She is lying pale and motionless on a bed, and her maids are weeping. Oh, she's dying!"

"Quick, jump on the carpet!" said Prince Ahmed. They all jumped on it, and wished themselves in the Princess's bedroom. When they got there Prince Ahmed let her smell his apple, and she regained perfect health.

"Now, which of us has won Nourounnihar?" said the brothers.

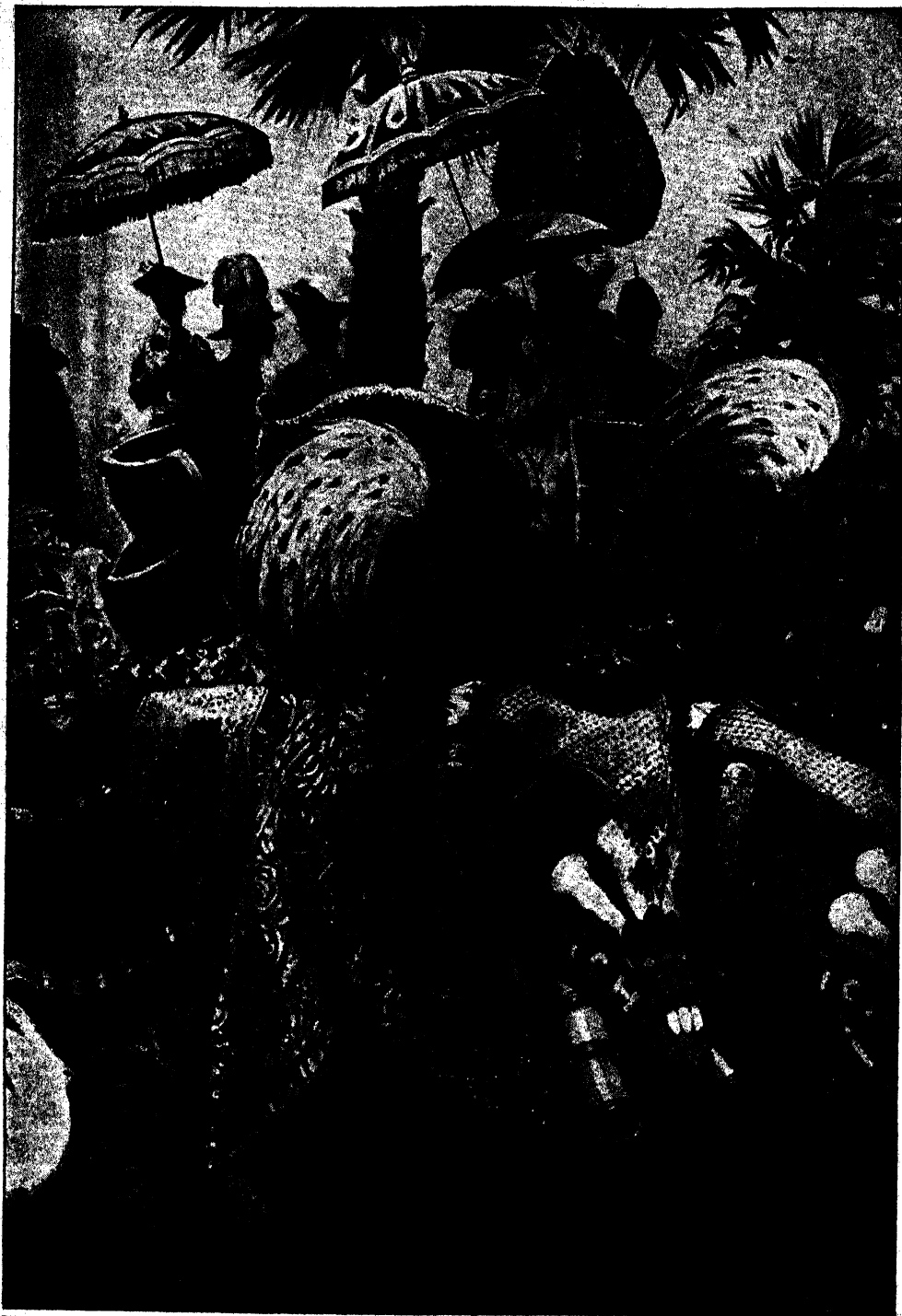
"You all had an equal share in curing

was the way in which his arrow had disappeared. He wandered for weeks about the plain seeking it, and at last found the palace of fairy Pari-Banou.

It was Pari-Banou who had sent the Criers with the magic carpet and the enchanted tube and the fairy apple. But she did not want Prince Ahmed to marry Nourounnihar, so she had caught up his arrow and carried it away. "She wanted to marry him herself. Ahmed fell deeply in love with her, and married her, and with her help he became the Sultan of India.

THE NEXT STORIES BEGIN ON PAGE 1807.

THE SPLENDOR OF TRAVELING IN INDIA



The native rulers of India are the owners of the most wonderful jewels in the world. Their clothes and property are most magnificent. In this picture we see the present King and Queen, during a visit to India, riding on elephants decked with brilliant trappings. Many of our richly-colored carpets come from India.

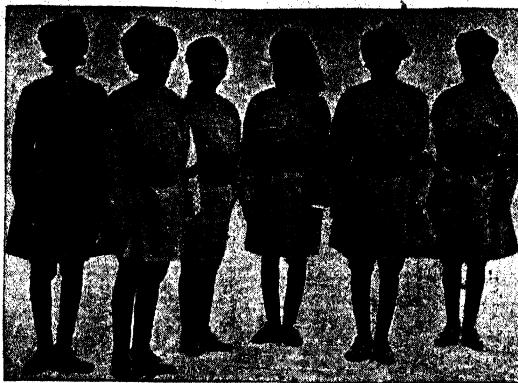
The Book of ALL COUNTRIES



Humayun



Akbar Khan



Native Soldiers of India



Shah Jehan



Aurungzebe

HOW INDIA BECAME AN EMPIRE

THE story of India begins a long, long time before the story of England. For the first person who wrote down anything about England was Julius Cæsar, and that was only about fifty years before Christ was born—not quite two thousand years ago. But we know something about the people in India two thousand years before that. It was before Moses led the children of Israel out of Egypt, before even Abraham was born, that a people who spoke an Aryan language conquered the northern part of India. Learned people have found out that the languages which are spoken in Europe have grown up by degrees from one original language which was spoken ages ago by the ancestors of all these peoples. All the languages which have grown up from that one are called Aryan; so because the people who conquered India more than four thousand years ago spoke an Aryan language, we know that they came from the same stock as the races of Europe.

Now, the races who peopled India before talked quite a different kind of language. When the Aryans came into India through the mountain passes of the north-west, they did not destroy these people utterly, but made some of them servants or slaves; while the rest fled before them into

CONTINUED FROM 1638



the hilly country, which was more difficult to conquer than the great plains, just as the Britons in England were driven into the hills of Wales by the Angles and Saxons. The Aryans made themselves lords of all the rich lands of Hindustan, keeping many of the old inhabitants as slaves, hewers of wood and drawers of water, like the children of Gibeon. That is how those four castes grew up of which we read on page 1636. Three of these were the castes of the Aryan conquerors, which included the Brahmins, to whom belonged the priests and the men of learning, the warriors, who were called Rajputs, and those people who followed employments which were held less honorable than these. The fourth caste consisted of the conquered people, who were accounted altogether contemptible.

Moreover, by degrees the Aryans made conquest of most part even of the hill countries, yet not so completely as in the great river basins of the Indus and the Ganges; so that instead of making the people slaves, they became mixed with them. That is why in the south there are far fewer Brahmins or Rajputs of pure blood than in the country to the north.

Because it was no easy matter for invaders to make their way into India, great kingdoms grew up in Hindustan

and in the Deccan, which had little enough to do with the world beyond the mountain barrier, their people knowing hardly anything of the great empires of Babylon and Assyria and Egypt.

HOW THE PERSIANS AND THE GREEKS CAME DOWN UPON INDIA

Long before Homer sang the tale of the fall of Troy, long before Romulus raised the first earthen rampart of Rome, Indian singers were telling the great deeds of their heroes, and Indian law-givers were shaping the laws of the Hindus. This we know, because their poems and their law books have come down to our own time, and learned men study them even to this day. Of their law-givers, the most famous is Manu.

Now, it would seem that when the Persian Empire was at its mightiest, just before King Darius made war upon the Greeks, the Persians made their way into India, and caused the kings of the Punjab—which means the land of the Five Rivers that flow into the Indus—to pay tribute; so that strange tales of the Indians came to the Greeks, of which this at least was true—that they would not eat flesh. But it was not till another hundred and fifty years had passed that the Greeks themselves were led by the mighty conqueror, Alexander the Great, through the great mountain passes. When they came into the Punjab, they were met in battle by the valiant Indian prince who was called Porus; though it would seem that this was not his own name, but a title borne by all those princes, just as all the kings of Egypt were called Pharaoh. In that battle, Porus was overthrown, so that Alexander made himself lord of all the Punjab; but because Porus was a wise man and valiant, Alexander made friends with him, and gave him back his kingdom, though he was still subject to the Greeks.

HOW ALEXANDER'S EMPIRE BROKE UP AND A GREAT RULER ROSE IN INDIA

Some few of the Greeks abode in the Punjab, for some of their coins and their carvings have been found there; but after the empire of Alexander was divided, the veil fell again between the East and the West, and the nations of India went their own way as before. Moreover, it was only the peoples of the Punjab that were ever reached even by the Greeks. In those days there arose in

Hindustan a very great ruler whose name was Asoka, whose fame for justice and mercy was spread over all India. He became lord of nearly all Hindustan, and even far away south in the Deccan his name was revered. Moreover, under his rule the doctrines of the great teacher, whom men for the most part call Buddha, but who had many names, were spread abroad, and many Buddhist temples arose. But of Buddha himself, who lived long before Asoka, we read in another place.

Now, for nearly a thousand years there is little more that need be told, except that men say that there were disciples of Jesus who made their way to India and preached the Gospel there; yet there were but few who believed. And again the teaching of Buddhism became corrupt, and the old religion took its place again, though this, too, had become changed and corrupt. This is the religion called Hinduism, which is followed by three-fourths of the people of India even to this day.

HOW MUSSULMAN CONQUERORS POURED INTO HINDUSTAN AND SET UP KINGDOMS

Then there came a change, for when Mahomet had begun to teach the new faith which is called Islam, his successors set forth to compel all men either to become Mussulmans themselves, or the subjects of Mussulmans; and before long some of the Arabs, or Saracens, invaded India. However, it was not till Mahomet had been dead for nearly four hundred years—a thousand years after the birth of Christ—that Mussulman conquerors began to pour into India at the head of great armies, and to set up kingdoms in Hindustan, where Mussulman kings, with armies of Mussulmans, ruled over Hindu subjects. The first of these was called Mahmud of Ghazni, who conquered all the north of Hindustan with soldiers from Afghanistan beyond the mountains. And after this there were many Afghan and Pathan rulers, and Turks also, who reigned at Delhi, and others who set up kingdoms in the south, whom the Hindus hated as foreign conquerors; but because the Mussulmans were for the most part soldiers, they generally won the mastery.

At last, when Henry VIII. was King of England, Hindustan was invaded by Babar, founder of the Mogul Empire. So valiant and daring a warrior was he,

THE OLD AND NEW RULERS OF INDIA



This picture shows an English ambassador's first visit to a ruler of India. England first went to India by sea, and at the time of the rise of England's sea power, Elizabeth sent Sir John Mildenhall in 1599 to Akbar, the Great Mogul, to apply for trading privileges for a company to whom she wished to grant a charter.



This picture helps us to understand the vast change that has come over India. For 250 years British influence grew in India, but the country was still under the sway of native rulers until near our own time. To-day the King of England is Emperor of India, too ; and in India King George V. is called Emperor George. Many years ago the late King Edward VII. visited India when he was Prince of Wales, and this picture shows his meeting with some of the native princes of India, who are now loyal to the Crown.

that with an army of twelve thousand men he overthrew the greatest kings of Hindustan, both Mussulmans and Hindus.

THE FOUNDING OF THE MOGUL EMPIRE, AND THE GREAT KING AKBAR

After him, his son, Humayun, had troublous times, and was driven out of the land, but had almost made himself king again when he died. But Humayun's son Akbar was one of the most famous and the greatest of all kings, for he was not only so great a warrior that he brought all Hindustan under his sway from the mountains on the west to the ocean on the east, but his rule also was exceedingly wise. He did not seek, as most kings did in India, to rule by the sword and oppress the people, but resolved to extend equal justice to all, whether Hindus or Mussulmans. He began to rule two years before Queen Elizabeth, and his reign lasted for fifty years, so that he outlived her for a little time; and when he died he left a greater empire, stronger and better governed, than India had known since the days of Asoka.

In his days, and in those of his son Jehan Gir, there came to India travelers from Europe, who brought home wonderful tales of the splendor of the court of the Great Mogul. There even came to Jehan Gir an ambassador from King James I., Sir Thomas Roe, seeking his friendship. But Jehan Gir brought little good to India, for he cared only for his own pleasures, and not for the good of the people over whom he ruled. A much better emperor was his son, Shah Jehan, who built the famous Taj Mahal as a memorial of the wife he loved, as we have read on page 1637.

HOW THE RULE OF INDIA PASSED INTO THE HANDS OF THE BRITISH

After him, his son Aurungzebe ruled for nearly fifty years, and strove to bring all India under his sway, overthrowing the great kingdoms that were still in the Deccan; yet thereby he wrought the ruin of the empire, since it became too large to be held under control; so it had to be divided into great provinces. And after his day the ruler of each province cared little enough for the Great Mogul at Delhi, but went each his own way as if he had been an independent king under no control.

And so it fell out that the lordship of

India passed away both from Hindus and Mussulmans, who were somewhat akin in spite of all their differences, into the hands of the British, who were not akin at all in race or manners or religion, though they were descended from the same stock from which the Brahmins and Rajputs had sprung more than four thousand years ago.

Just before Babar conquered Hindustan, the Portuguese had found that they could sail to India round the south of Africa; and they got possession of some harbors on the Persian Gulf, and on the coast of India, and in the islands to the south-east, and began to trade there. Then, a hundred years later, King Philip of Spain made himself King of Portugal; and since he was at war with the English and the Dutch, both of them were ready to try and get all his trade into their own hands. So just before Queen Elizabeth died, the English and Dutch each set up a company to trade with the Indies.

THE FACTORIES WHICH BROUGHT ABOUT THE NEW TIMES IN INDIA

Then the English persuaded first one and then another of the native rulers, who were the subjects of the Great Mogul, to let them set up a trading station, which was called a "factory," at Surat, and at Madras, and at Calcutta. When Portugal freed herself from Spain, King Charles II. married a Portuguese princess, and the Portuguese gave him Bombay, of which city they had gained possession in the old days. The French, too, following the example of the English, got permission to set up factories at Pondicherry, which is not far from Madras, and at Chandernagore, which is not far from Calcutta. All of which things befell while the Great Moguls were still mighty, before Aurungzebe died.

Then, just when the Mogul Empire was breaking up into a number of provinces, which were really independent kingdoms, there arose a great rivalry between the British and the French, each of them seeking to win favor with the native princes, so that they might secure all the best of the trade, and shut the others out. As the disorder grew greater within the empire of the Moguls, and as it also seemed likely that Great Britain and France would go to war with each other over quarrels that they had

NATIVES OF INDIA AND THEIR RULERS



A YOUNG RAJAH, OR PRINCE, OF INDIA



A MAHARAJAH, OR GREAT PRINCE, OF INDIA



A MOHAMMEDAN AT PRAYERS



A FARMER AND A WARRIOR

There are many kinds of people in India, and the hill peoples differ widely from the people of the lowlands. The rulers lived in great magnificence and wielded great power before the British ruled the country. Their costumes, and those of the people, are very picturesque, and a man's rank or occupation is indicated by his dress.

in other parts of the world, a very clever Frenchman in India, whose name was François Dupleix, thought that he might manage to turn the British out.

THE FRENCHMAN WHO TRIED TO CONQUER INDIA FOR FRANCE

Nobody thought about conquering India, but Dupleix thought that if the British were out of the way, the French would be able to make themselves so useful to anyone they chose to help in the quarrels that were likely to arise more and more frequently among the native rulers, that they would soon be able to get very nearly anything they might ask for. He was the more sure of this, because he saw that French troops could fight much better than the native armies, and he thought that if native soldiers were trained and commanded by French officers they would be nearly as good as French troops.

So when the expected war between Great Britain and France broke out, Dupleix attacked the British at Madras and captured it. Then the ruler of that part of India, who was called the Nawab of the Carnatic, wanted to turn the French out of Madras, and Dupleix had the chance of showing that his idea about training native troops under French officers was right. He did it, too, for a mere handful of men scattered quite a large army which the Nawab sent against them. The French had to give Madras back after all, because when the war came to an end both sides gave back what they had taken; but then, as Dupleix had expected, native rulers began to quarrel, and one side made haste to ask the French to help them. Then of course the British took the other side in the quarrel.

THE CLERK WHO DROVE THE FRENCH ARMY OUT OF INDIA

This time the fortune of war went against the French, for while the French and their allies seemed to be getting the better of the allies of the British, a daring young officer named Robert Clive—who had joined the Army at the end of the last fighting, having been only a clerk before that—was sent with a few hundred sepoys, or native soldiers, and a very few British volunteers to attack the enemy's capital, which was called Arcot. Clive captured Arcot, and then, with his few men, defended it so stoutly

against a great army that presently he put that army to utter rout. After that the British and their allies got the best of it. Although peace was again made in India, before long yet another war broke out between Great Britain and France, and this time the British beat the French so thoroughly that they had to promise not to keep soldiers in India any more.

So instead of the French getting rid of the British, as Dupleix had hoped, the British got rid of the French, and could carry out the plans which Dupleix had meant the French to carry out for themselves. The French had taught the British how to make themselves powerful in India, and the British had learned the lesson.

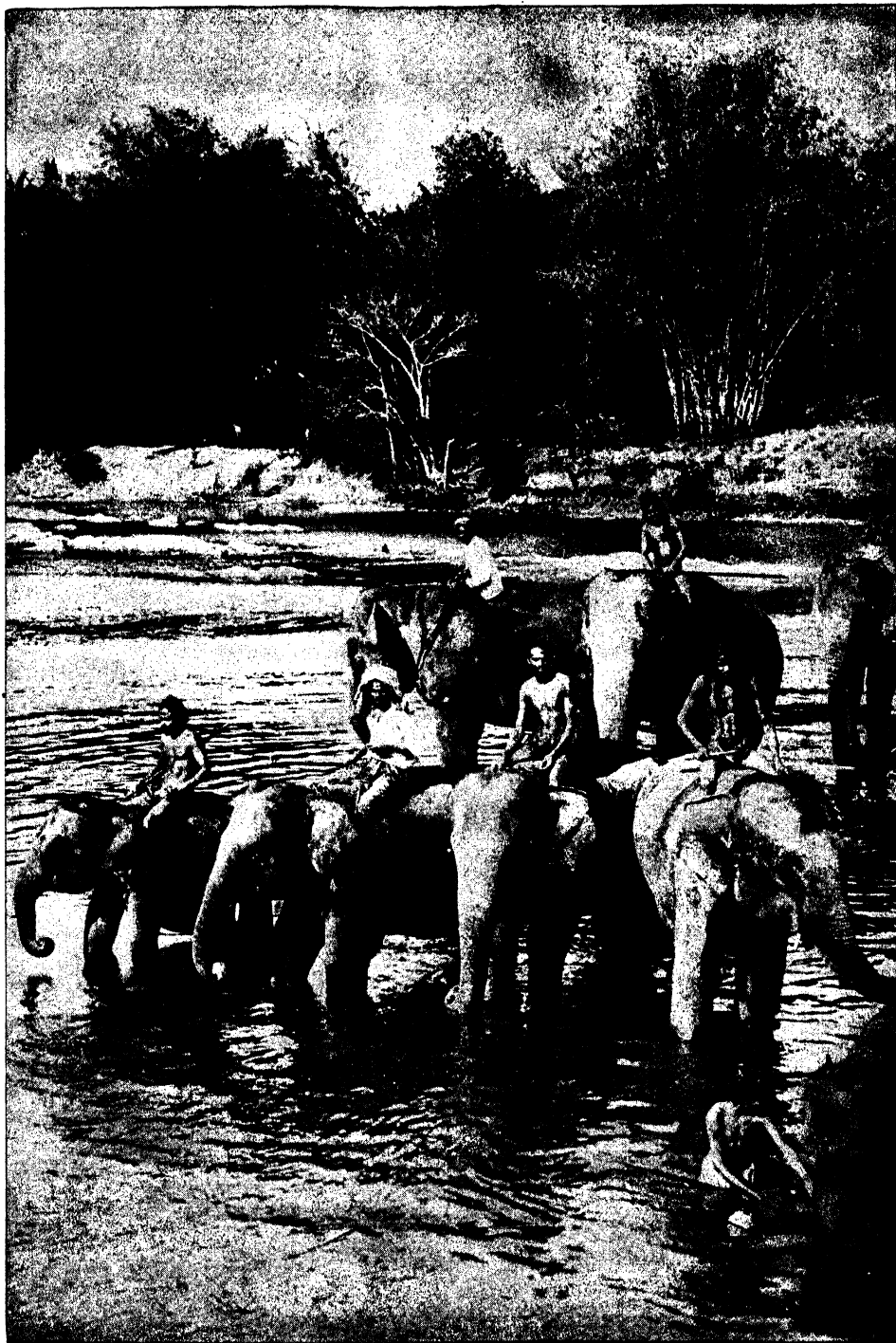
Before the French had been quite got rid of, another thing happened, which made the British masters of the very important province of Bengal.

THE CRUEL RULER WHO SHUT UP PEOPLE IN THE BLACK HOLE OF CALCUTTA

The ruler of Bengal, like the ruler of the Carnatic, was called the Nawab; and his name was Surajah Dowlah. He was very silly and very cruel. Because he was offended with something that the British people at Calcutta had done, he seized nearly a hundred and fifty of them, and shut them all up on a stifling hot night in a little room with only a tiny window, ever since called the Black Hole of Calcutta; and the result was that nearly all of them were dead before morning. Of course the British at Madras determined to punish the Nawab of Bengal for his crime; and Clive was sent off by sea with a few troops, and some ships of the Navy which happened to be at hand. He very soon routed the Nawab's soldiers, and took Calcutta again; and then a number of the native chiefs who had resolved to get rid of Surajah Dowlah asked Clive to help them.

Clive then marched against the Nawab with an army of three thousand men, and the Nawab marched against him with fifty thousand. At the famous battle of Plassey the three thousand routed the fifty thousand; Surajah Dowlah was killed; and then all the native chiefs made submission to Clive. Although he appointed a new Nawab, he had himself to become the real ruler of Bengal, and after a little

ELEPHANTS DRINKING IN THE SACRED GANGES



Here we see native trainers bringing their elephants to drink. The elephant, though strong enough to crush out a man's life with one of its huge feet, is very gentle and affectionate when treated kindly. A well-trained elephant will obey the slightest word or gesture of its driver, or mahout. The strength, the gentleness and sagacity of these tame elephants make them very valuable as beasts of burden.

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while the Great Mogul agreed that Bengal should belong to the British.

THE FIGHTS BETWEEN THE BRITISH AND THE NATIVE RULERS OF INDIA

In this way, although the British had not planned any such thing, they suddenly found that their trading company, with its few factories, had become ruler of a whole great province, while the Nawab of another great province, the Carnatic, had promised them obedience. The two provinces together were only a small part of India, as if a foreign power had become master of two or three of our new England states. But they were larger than any of the provinces ruled by a single native prince—except, of course, the Mogul, who was supposed to rule over all of them, including the British. Then the Government in England appointed a governor-general for these new dominions—Warren Hastings—who has been very much blamed for some of his doings, and was impeached for them in Parliament, because people did not understand why he had acted as he did. Yet it was owing to him that a good and strong government was finally established at all.

Now, while the British were chiefly anxious to secure what they had won, and to establish a good government in those provinces, the native rulers made sure that they wanted to conquer more; besides which, two or three of the native rulers were anxious to enlarge their own territories, and perhaps to make themselves masters of all India, now that the Mogul's real power was so small; therefore they would have liked to turn the British out again.

It thus happened that three times in the course of twenty years the great southern state of Mysore defied the British, and a little later the people of Nepal, which is in the mountains along the north side of India, where they edge the plain of the Ganges, tried to take possession of part of the plain below them.

THE SPREAD OF BRITISH RULE OVER ALL INDIA, AND THE TERRIBLE MUTINY

So there was war with them, at the end of which they, too, gave up part of their lands; but the people there, who are called the Ghurkas, made friends with the English, and now the Ghurka

regiments in the British Army are some of the best regiments in the world. Then a number of princes of the race called Mahrattas made war with Great Britain, and from some of them also the greater part of their lands were taken away. Last of all the Sikhs, who ruled in the Punjab—their name is pronounced *seek*—invaded British territories, and rose against the British, as Mysore had done, and when the war was over the British took possession of the Punjab. Then all India within the circle of the mountains and the sea was under their rule, though the princes who had not brought on the war were allowed to remain the lords of their realms, on condition that they did not rule as tyrants, or try to stir up wars. But in the year 1857 there came a terrible time, when the Sepoy regiments all along the Ganges plain mutinied against their officers and against British rule, the Mussulmans among them seeking to restore the old dominion of the Moguls. Where there were enough regiments of British soldiers, the mutiny was kept in check; but where there were many native regiments and few white soldiers, defence was difficult.

THE PEACE THAT CAME AFTER THE MUTINY, AND THE NEW EMPIRE

At Cawnpore, the leader of the rebels, Nana Sahib, promised to spare the British if they surrendered; but he broke his word and murdered them all. At Lucknow, the garrison held out and endured through a long siege, till they were relieved, first by Havelock and Outram, and then by fresh troops from England led by Sir Colin Campbell. Because there was a great rising of mutineers at Delhi, where the Mogul was, a British force besieged the city, and took it after a time. But after Sir Colin Campbell had arrived with his fresh troops, it was not very long before the revolt was crushed altogether.

After that the British nation said that it was time to end the ruling of India by a company of merchants; so the Queen of England ruled India. Finally, in 1877, Queen Victoria was given the title of Empress of India, because the Mogul rulers had been called Emperors. Now the King of England is also Emperor of India, with its many millions of people.

THE NEXT STORY OF COUNTRIES IS ON PAGE 1781.

The Book of SCHOOL LESSONS

WHAT THESE LESSONS TEACH US

THE Reading lesson in these pages teaches us what we mean when we speak of singular and plural numbers. Our Writing lesson shows us how to write more letters that come above and below the line, and in our Arithmetic lesson we learn how to add little numbers together. There are still more surprises for us in the Music lesson, and our Drawing lesson shows us how to draw a box and a table. The Picture-Story in French describes how the party, which has now reached Paris, spend their first evening at the hotel.

CONTINUED FROM PAGE 1475

.. READING ..

THE DIFFERENCE BETWEEN ONE AND TWO

WHEN you see a dog come running round the street corner, you call out, "Look at that **DOG!**" but if another dog came with the first one you would say, "Look at those **DOGS!**"

And if I gave you a penny you would tell mother, "I have a **PEN-NY**," but if I gave you two you would say, "I have two **PEN-NIES**."



PENNY



PENNIES

Then the Queen of Hearts did not make only one **TART**; she made many **TARTS**, and the naughty knave came and stole them away.



TART



TARTS

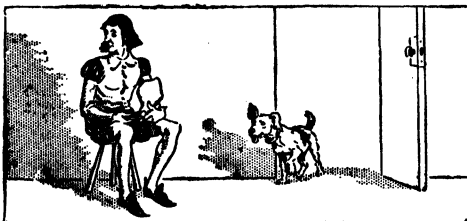
So, you see, there is a difference between **DOG** and **DOGS**, and between **PENNY** and **PENNIES**, and between **TART** and **TARTS**. **DOG** means only one dog, but **DOGS** means any number of them—two, or three, or a hundred, or a million. We say that **DOG** is in the *singular* number and **DOGS** in the *plural* number. When there is only one thing it is singular; when there are more than one it is plural.

If you look in the looking-glass you will see that you have two hands; but put one in your pocket and you will only see one hand in the looking-glass. So, you see, we talk about one **HAND**, but two **HANDS**.

Go on looking in the glass, and you will see many more things that you can make either singular or plural. Here are some of them:

EYE	EYES
LIP	LIPS
ARM	ARMS
THUMB	THUMBS
FIN-GER	FINGERS
NAIL	NAILS
LEG	LEGS
FOOT	FEET

Now you will be able to read this riddle, and to answer it as well:



Two **LEGS** sat upon three **LEGS** with one **LEG** in his **ARMS**;

In came four **LEGS** and ran away with one **LEG**;



Up jumped two **LEGS**, picked up three **LEGS**, and threw them at four **LEGS**.

By this time we are ready for some rhymes, so here they are. They are not the rhymes that we know, are they? But perhaps we shall like them as well.

When
PUSS
IN
BOOTS



wears
STOCK-
INGS
too,



And Mary is not so contrary,

When
RED
RIDING
HOOD



is
dressed
in
blue,

And
every
CHILD



becomes
a
FAIRY,



We'll fly away,
I think—don't you?

When
the
little
BOY



who
plays
the
HORN



Is dressed in green instead of blue,

When
MILK-
MAIDS



are not
all
forlorn,

And every fairy tale comes true,
We'll fly away,
I think—don't you?

When
SPIDERS



all stop
catch-
ing
FLIES,



And tell Miss Muffet what to do,

There'll
be no
COB-
WEBS



on the
skies,



OLD
WOMAN
with
the

BROOM,
for
you;



So fly away
And find your shoe.

When
KINGS



no
longer
count
their
MONEY,



And
BLACK-
BIRD
PIES



hold twenty-
two,

When
QUEENS



like
jam
much
more
than



HONEY

And maids have noses fixed with glue,
I think it will
Seem queer—don't you?

PRIMARY READING LESSON

There was an old	Old woman, old woman,
woman,	old woman, quoth I,
Tossed up in a basket,	Where are you going
Seventeen times as	up so high?
high as the moon,	To sweep the cobwebs
Where she was going,	off the sky.
I could not but ask it,	May I go with you?
For in her hand she car-	Aye, bye and bye.
ried a broom.	

Old woman, old woman,	May I go with you?
old woman!	Aye, bye and bye.
Where are you going?	May I go up so high?
Where are you going in	Aye, bye and bye.
a basket?	Will you come back?
Where are you going	Aye, bye and bye.
with a broom?	

I go up, up, up!	I am in a basket,
I go so high, so high, so	I go up to the sky,
high!	I go up to brush the
Up over the tree-tops,	cobwebs off.
Up over the moon,	Here I go up, up, up!
To the sky, to the sky,	Good-bye! good-bye!
to the sky!	good-bye!

ACTION SENTENCES

Play you are the old	Take the broom,
woman,	Sail away.
Jump into the basket,	Come back again.

LITTLE VERSES FOR VERY LITTLE PEOPLE

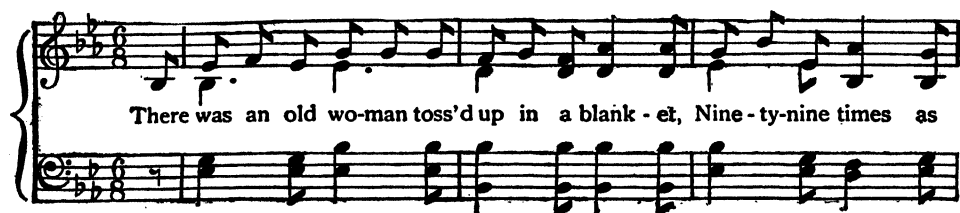
GOOD little boys should never say
 "I will," and "Give me these."
 Oh, no! that never is the way,
 But "Mother, if you please."

And "If you please," to Sister Ann
 Good boys to say are ready;
 And "Yes, sir," to a gentleman,
 And "Yes, ma'am," to a lady.

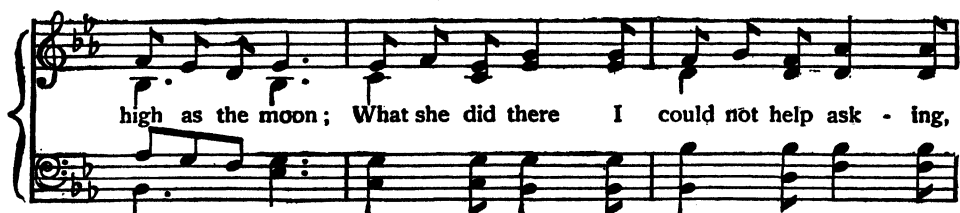
ST. SWITHIN'S DAY, if thou dost rain,
 For forty days it will remain
 St. Swithin's Day, if thou be fair,
 For forty days 'twill rain nae mair.

IF Candlemas Day be bright and fair,
 Winter will have another flight;
 If on Candlemas Day it be shower and rain
 Winter is gone and will not come again.

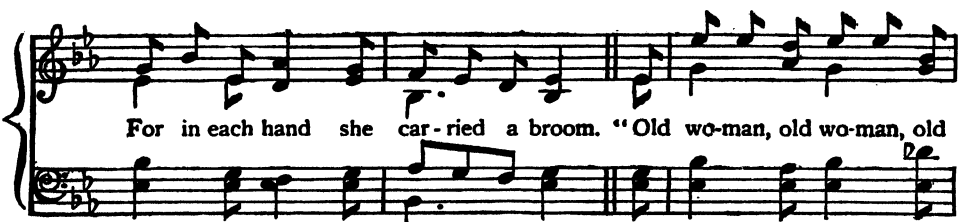
THE OLD WOMAN TOSSED UP IN A BLANKET



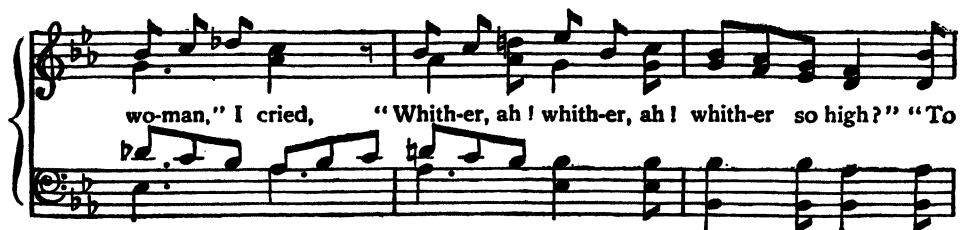
There was an old wo-man toss'd up in a blank-et, Nine-ty-nine times as



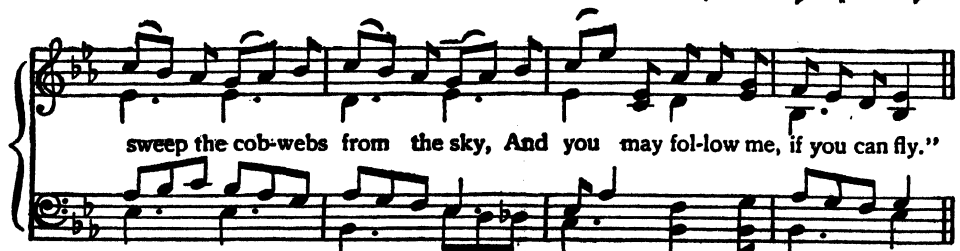
high as the moon; What she did there I could not help ask-ing,



For in each hand she car-ried a broom. "Old wo-man, old wo-man, old



wo-man," I cried, "Whith-er, ah! whith-er, ah! whith-er so high?" "To

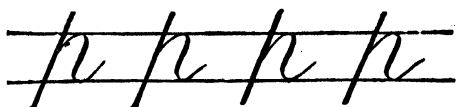


sweep the cob-webs from the sky, And you may fol-low me, if you can fly."

MORE LETTERS BELOW THE LINE

"ARE there more letters with loops below the line, mother?" asked Nora, when she and Tom next came to their mother for the writing lesson.

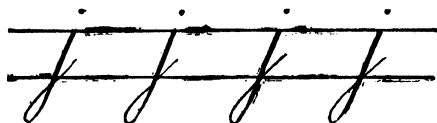
"Four of them," her mother said, "and I hope we shall write all of them to-day. But first we are going to write one other letter with a stroke below the line, but without any loop. It is p. What do you think of it?" she asked, as she wrote some like this:



Nora thought it reminded her of h—at least, the last part of it was just like h; and Tom said the first part was a long stroke.

"You are both right," said their mother; "p does begin with a long stroke, and ends like h, but we must be careful to make the stroke the proper length. It goes above the upper line just as far as t does, and below the lower one not quite so far as any other letter with a tail. We must remember that it does not go very far above or below the line.

"This is the next letter, j," continued the children's mother, as she wrote it:

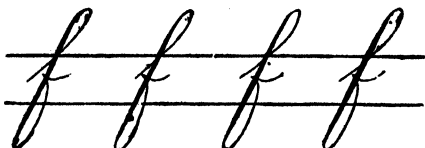


"J has a loop," said Nora, "and—Why, it has a dot! Look, Tom!"

"Each letter i has its own little eye," said Tom, who remembered all about i.

"J," said his mother, "really did grow from i, just as a plant grows from a seedling. Once there was no j; but it was useful to have one, and so someone made i grow a looped tail. We must take care to make the loop just like that of g. Let it cross over just below the line, Tom.

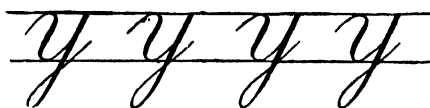
"The next letter, f, has two loops, and this is how we write it:



"There is this to notice about f: the upper loop is not quite so tall as that of other looped letters, and what do you see strange about the lower loop, Nora?"

Nora watched while her mother wrote an f, and then said the lower loop was on the other side. Tom said she meant the right side, and their mother showed how it ended half-way between the lines near the middle of the letter on the right side of it, as Tom had said. Nora thought f was a pretty letter, because she liked making the loops, but neither she nor Tom found it very easy to write at first, for they wanted to make the lower loop on the left side, like that of g and j, and the loops looked uneven; but they tried again and again till they made nice ones.

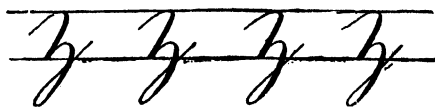
"There are only two more small letters to write—y and z, and then you will know all the small letters," their mother told them, as she wrote y like this:



Tom noticed that y began like the last part of h, and, Nora added, like the last part of m and n also; and both of them found its tail had just the same loop as that of g.

"Now the last letter of the alphabet, Tom," said his mother.

"Z," he promptly replied, as he watched her writing it like this:



She pointed out how z starts with a hook, as y does, but leans more to the right, and then makes a much smaller curve just above the lower line, ending in a loop like that of g. Only the middle curve was new to Tom and Nora, and they soon succeeded in making it nicely, and then their mother told them that before very long they should learn to do something quite new.

ADDING THE NUMBERS TOGETHER

NOW that we know the names of the numbers up to 99, we can learn how to add together numbers which are bigger than those we used in our addition sums last time.

We will try first with the numbers 65 and 32. Suppose we have 65 pencils, and we arrange them in the same way as we did those on page 1467. We know there will be 6 bundles of ten, and 5 loose pencils. If we put them in our two boxes, the boxes will be numbered like this: $\boxed{6} \boxed{5}$

Next we take our 32 pencils. These will make 3 bundles of ten, and 2 loose pencils. Now, if we put the loose pencils into the right-hand box, there will be in it altogether 5 pencils and 2 pencils, which make 7. And putting all the bundles into the left-hand box, there will be 6 bundles and 3 bundles, which make 9 bundles altogether. So that we shall have to alter the figures on the boxes into 9 and 7, for 9 bundles and 7 loose pencils, which is ninety-seven (97) pencils altogether.

If after doing this problem with the help of the pencils we had to write it down in our books, we should do it this way: We first write down 65, which means 6 "tens" and 5 "ones"; then underneath the 65 we write the 32, which means 3 "tens" and 2 "ones," taking care to write the "ones" under the "ones," and the "tens" under the "tens," and drawing a line under them like this:

$$\begin{array}{r} 65 \\ 32 \\ \hline \end{array}$$

Next we count up the "ones," and say 2 and 5 make 7. So we write down a 7, for 7 "ones," underneath the 5 and the 2. Having counted the "ones," we count the "tens" in the same way. 3 and 6 make 9; and we write a 9, for 9 "tens," underneath the 6 and the 3. This tells us that the answer is ninety-seven, and our sum now looks like this:

$$\begin{array}{r} 65 \\ 32 \\ \hline \end{array}$$

make 97

Very likely, now, we can do another sum like that, without having to think

about the boxes and do all the counting. We can write down the two numbers in the proper way, so that the "ones" of the second number come under the "ones" of the first number, and the "tens" of the second under the "tens" of the first, and then count how many "ones" and "tens" there are altogether.

The gardener gathered 44 apples off one tree, and 25 apples off another. How many apples were there altogether?

The first tree had 44 apples.

The second had 25 apples.

make 69 apples.

Here are two more questions for you to work out by yourselves:

1. A man traveled 52 miles by train one day, and 34 miles the next. How many miles is that altogether?

2. Tom had 40 marbles, and his uncle gave him 58 more. How many had he then?

Now we will try something a little bit harder—not very much, but not quite so easy as those we have just done. We will add together 47 and 23. Let us use the boxes again for a few minutes. 47 will be 4 bundles in the left-hand box, and 7 loose pencils in the right-hand box. Again, 23 will be 2 bundles in the left-hand, and 3 loose pencils in the right-hand. That makes altogether 10 loose pencils in the right-hand box, and 6 bundles in the left-hand.

$\boxed{4} \boxed{7}$ is how we have the boxes at first.

$\boxed{6} \boxed{10}$ is how we have them when we put the two sets together.

But *this* will not do. What is wrong? Too many loose pencils. We must never have more than 9 in the right-hand box. But, after all, it is very easy. We can *tie those ten loose pencils into a bundle and carry them to the bundle-box*. Then we shall have no pencils left in the right-hand box, and 7 bundles instead of 6 in the left-hand. The boxes will then be marked $\boxed{7} \boxed{0}$.

So now we have found out that 47 and 23 make 70. If we have to write the sum down on paper, we arrange the

two numbers just as we did before, with the "ones" under the "ones," and the "tens" under the "tens," like this:

47
23
—

Then we say, "3 'ones' and 7 'ones' make a 'ten.'" Write down a 0 under the "ones," because there are no "ones" left, and add the "ten" to the other "tens," saying, "1 'ten' and 2 'tens' make 3 'tens'; 3 'tens' and 4 'tens' make 7 'tens.'" Write a 7 under the "tens." After we have done a few sums of this sort we can do without saying even as much as that; we

can leave out the words "ones" and "tens."

47
23
—

make 70

Say, 3 and 7, 10; put down 0, carry 1.

1 and 2 make 3, and 4 make 7; put down 7.

Try to find the sums in the same way.

1. There are 34 houses on one side of the street, and 36 on the other side. How many houses are there on the two sides together?

2. One boy sold 22 oranges, and another sold 18. How many oranges is that altogether?

MUSIC

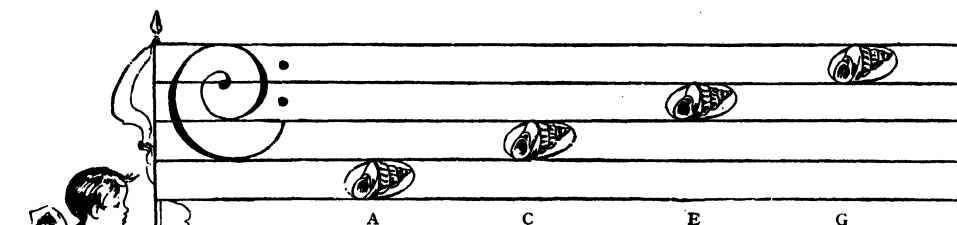
THE FAIRIES INSIDE THE SHELLS

LITTLE Bass Clef is very anxious to attract our attention. He has waited long and patiently to see what secret the flowers had to tell, and now he knows what a pretty surprise the fairies had prepared, he is very eager to see if the story whispered in his ears by the wind is true.

Once again we look at the motor-cars

that are lying in the spaces between the motor-lines where the cocoa-nuts are found.

The kind little fairies have given Treble Clef a treat, and they feel that Bass Clef must have his share in the happiness that comes to all good, industrious workers; so four of the wee people say they will make these four



The fairies' shells on Bass Road



waiting in the Treble Road, and we know that they belong to the Fairies E, G, B, D, and F.

The pretty flowers are still in the spaces between those same motor-lines, and are proud because the

Fairies F, A, C, and E dwell within their tiny petals.

The cocoa-nuts remain in their places on the five motor-lines in the Bass Road, very happy to be the homes of Fairies G, B, D, F, and A.

And now we have something else to find out. Look at the pretty shells

pretty shells homes of beautiful sound. In other words, they will come and sit inside the shells, and sing their pretty song when the right note on the piano is pressed.

Do you remember that little Bass Clef made us pass by the nine little white doors, which we now call notes, lying to the left of Fairy C's middle house (see the picture on page 1237), and when we came to the tenth note we pressed it very firmly, and immediately we heard the deep voice of Fairy G? Well, Bass Clef now says, "If you go to the little white note on the right side of Fairy G you will find out the song of the shell in this first space between Fairy G's cocoa-nut on line

THE ADDRESSES OF THE LITTLE FAIRIES



*Fairy E.
Line 1.
Treble Staff*



*Fairy G.
Line 2.
Treble Staff*



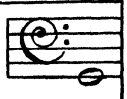
*Fairy B.
Line 3.
Treble Staff*



*Fairy D.
Line 4.
Treble Staff*



*Fairy F.
Line 5.
Treble Staff*



*Fairy G.
Line 1.
Bass Staff*



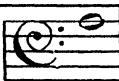
*Fairy B.
Line 2.
Bass Staff*



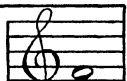
*Fairy D.
Line 3.
Bass Staff*



*Fairy F.
Line 4.
Bass Staff*



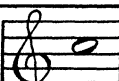
*Fairy A.
Line 5.
Bass Staff*



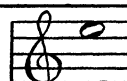
*Fairy F.
Space 1.
Treble Staff*



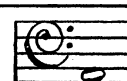
*Fairy A.
Space 2.
Treble Staff*



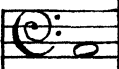
*Fairy C.
Space 3.
Treble Staff*



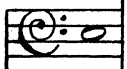
*Fairy E.
Space 4.
Treble Staff*



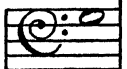
*Fairy A.
Space 1.
Bass Staff*



*Fairy C.
Space 2.
Bass Staff*



*Fairy E.
Space 3.
Bass Staff*

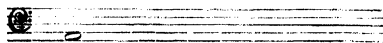


*Fairy G.
Space 4.
Bass Staff*

MUSIC

number one, and Fairy B's cocoa-nut on line number two. Press the little white note and listen :

Indigo shell, the song of the spray,
And space number one for Fairy A.



Fairy A's shell

"What about the second shell?" we ask Bass Clef. He shakes his wise little head, and tells us to go to the piano, saying, "You remember on which line Fairy B's cocoa-nut is to be found? Well, the very next white note on the right of Fairy B is the one to press, if you want to find out about the shell in the second space." Directly we press the note we hear this :

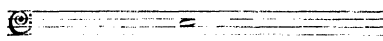
A tiny red shell, space number two,
Fairy C sings, "How do you do?"



Fairy C's shell

The third shell is now arousing our curiosity, and the only thing to do is to press the little white note between Fairy D's cocoa-nut on the third line and Fairy F's cocoa-nut on line number four. Press it and listen :

A yellow shell for Fairy E,
We both quite like space number three.

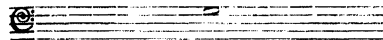


Fairy E's shell

One more shell, so one more fairy to find. To discover what we want we will again visit our piano, and choose the white note in the fourth space, lying

between Fairy F's cocoa-nut and the cocoa-nut which has been claimed by Fairy A. Press the note and we shall hear :

Space number four, little blue shell,
Fairy G's voice all news will tell.



Fairy G's shell

Do you not think that this magic kingdom of the piano is a very happy one? In the Treble Road we find fairies in their motor-cars, E, G, B, D, F. In the Bass Road fairies are laughing in their cocoa-nuts. Their names, as you know, are, G, B, D, F, A. Treble Clef again shows us fairies kissing the petals of the delicate flowers in which they have found so pretty a home—the Fairies F, A, C, E.

Bass Clef comes forward once more to introduce the fairies, who are seated inside the pretty shells, listening to the song of the waves. You know them by their names, A, C, E, G. All this, and much more, can be heard and seen by you and me, as day by day we find ourselves more at home in our magic kingdom. We must be quite sure we know how to address the fairies' letters when we write to them. So we will direct some envelopes, like those on the opposite page, ready for the little notes, when we want to write to them.

Staff, you know, is the fairies' word for road.

Now that we have seen how to direct the envelopes, shall we have a game of play, and see who can address the greatest number?

DRAWING

THE RIGHT WAY TO DRAW A BOX

TO-DAY we are going to learn how to draw a box. It seems quite an easy thing to do, but it really is not easy at all. In drawing boxes, just like everything else, there is a right and wrong way of doing it. On the next page we can see some of the wrong ones, and some of the right ones. Can you tell which is which without being told? Suppose we try to draw some ourselves, without looking at a real box, or any of the pictures.

I hope the one you have chosen is the right one. How many sides has it? An ordinary box has six sides—four standing up, and two—the top and the bottom—flat; but you can never see more than three at one time. Sometimes we can see only two, and sometimes only one; but we don't draw it often to show only one side, as it doesn't look like a box at all then.

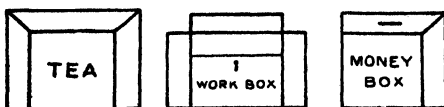
Choose a box with straight sides and a flat top, and put it exactly in front

of you a little way off on the table. If it is exactly opposite to you and your eye above it, you can only see two sides—the front and the top. Now move it to the right, and you will see three sides—the front, the top, and one other. Move it to the left, and you see three again, but they will not be the same that you saw before.

Get some brown paper, and pin it to your board, and get your white and black chalk. It is better to choose a square box to copy, although an oblong one will do. Put the box exactly opposite to you, and when you are drawing things like boxes, always begin with the part that is nearest to you. It is the front side this time, and that is easy, as it is only a square or an oblong. Take your black chalk, and make the best square or oblong that you can, and fill it in with chalk.

How can you make the top look flat? It will not look right if you make it the same size and shape as the front, because things look smaller when they get a little further away from us.

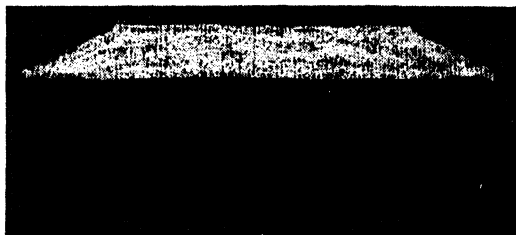
When you are in the street, the lamp-posts that are far away look quite tiny, yet they are the same size as those quite near; and when you are at the seaside, big ships look smaller and smaller as they



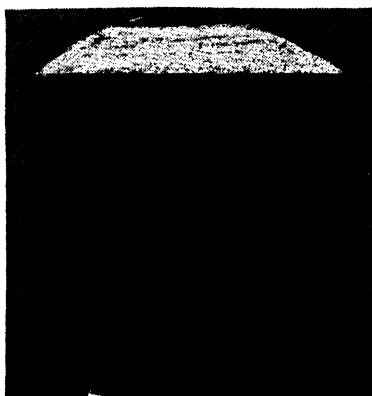
The wrong way to draw boxes



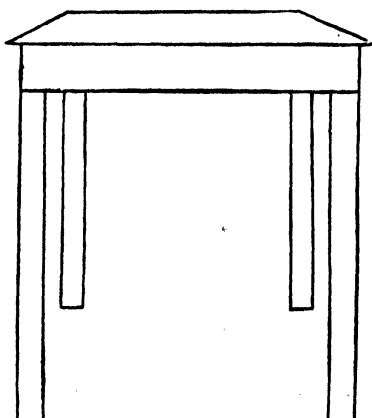
The right way to draw boxes



Oblong box drawn in black and white chalk on brown paper



This is a square box drawn in black and white chalk on brown paper



This picture shows how we may turn a drawing of a square box into a table

sail away from the shore.

So the part of the box that is furthest away from us must be smaller than the one nearest to us. The top of the box must slant, and look narrower than the front. You must look at the picture to see the way to do it.

Make the top with white chalk, because it will look the lightest part. If you were drawing with your back to the window, the front side might look the lightest, but you must never draw with your back to the light, because it is very bad for the eyes.

We shall not learn this time how to draw the box when it shows three sides, as it is difficult to do; but if you like to get your pencil now, and some white paper, you can copy the last picture on this page, which shows how to turn a box into a table.

Draw the box first, then put some more lines to make the legs and the thickness of the wood. Rub away the line that is dotted, and there is the table.

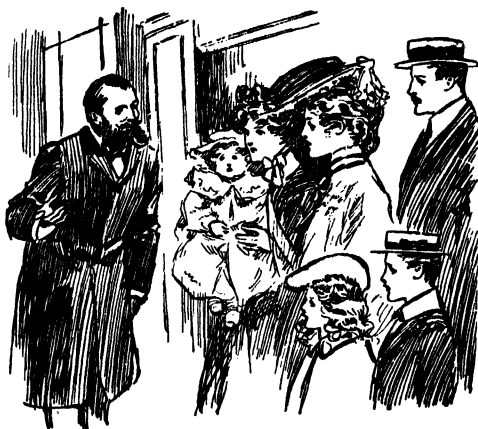
Square legs would show the sides as well as the front, but we must not attempt to draw the side view just yet.

Why are the back legs shorter than the front? They are not really shorter in a real table, but those that are furthest away from us always look shorter.

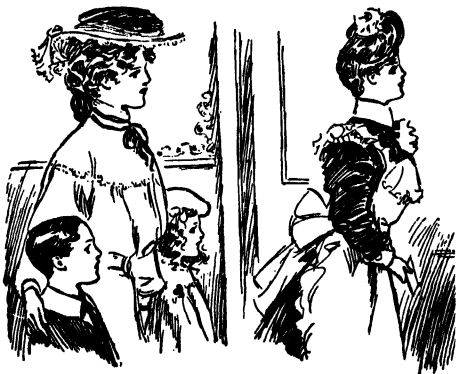
LITTLE PICTURE-STORIES IN FRENCH

IN our story this time, which is continued from page 1475, we read how the party spend their first evening in Paris. The first line under each picture is the French, the second gives the English word for the French word above it, and the third line shows how we make up the words into our own language.

Nous sommes à l'hôtel.
We are at the hotel.
We get to the hotel.



Le maître d'hôtel nous salue.
The manager of hotel us salutes.
The manager greets us.



La bonne nous montre nos chambres.
The maid to us shows our rooms.
The maid shows us our rooms.

Nous lui demandons son nom.
We of her demand her name.
We ask her her name.

Elle répond : "Annette."
She replies : "Annette."
She answers : "Annette."

Bébé a bien sommeil
Baby has much sleep.
Baby is very sleepy.



Maman dit : "Embrasse-moi, bébé."
Mamma says : "Embrace me, baby."
Mamma says : "Kiss me, baby."

Tantôt nous entendons un petit cri.
Presently we hear a little cry.
Presently we hear a little cry.

Jeannette court à la porte.
Jenny runs to the door.
Jenny runs to the door.



Une petite fille est là.
A little girl is there.
A little girl is standing there.

Jeannette la conduit à maman.
Jenny her conducts to mamma.
 Jenny leads her to mamma.

Elle pleure.
She cries.
 She is crying.



Maman la console.
Mamma her comforts.
 Mamma comforts her.

Elle a perdu sa bonne.
She has lost her nurse.
 She has lost her nurse.



Nous lui montrons de drôles d'images.
We to her show of droll of pictures.
 We show her some funny pictures.

Elle éclate de rire.
She bursts of to laugh.
 She bursts out laughing.

Quelqu'un frappe à la porte.
Someone knocks at the door.
 Someone knocks at the door.

Maman crie: "Entrez!"
Mamma cries: "Enter!"
 Mamma calls out: "Come in!"

La porte s'ouvre.
The door itself opens.
 The door opens.

Une jeune femme entre.
A young woman enters.
 A young woman comes in.



C'est la bonne de la petite fille.
It is the nurse of the little girl.
 It is the little girl's nurse.

La bonne tend les bras.
The nurse tenders the arms.
 The nurse holds out her arms.



La petite fille court à elle.
The little girl runs to her.
 The little girl runs to her.

Nous crions tous: "Bonsoir!"
We cry all: "Good-evening!"
 We all call out: "Good night!"



MAKING A SET OF DOLL'S FURNITURE

THE DRAWING-ROOM AND BEDROOM

TO make a charming suite of doll's furniture of any size to suit the room it is for, one only needs a coil or two of silk-covered round hat-wire, which costs a nickel the coil of three yards, a scrap of colored satin or plush for the cushions, and a needle and thread. A small pair of pliers is useful, especially the sort one can sometimes buy at a dime a pair. They are not strong enough for real tools, but they do very well for this work, as they are without the file-like roughness on the inner surface which proper pliers have, and therefore would not be so likely to rough up the silk covering of the wire. But fingers can generally do all the bending required.

The drawing-room set which we are going to make consists of two easy-chairs (lady's and gentleman's), a sofa, a gipsy table, and six small chairs in black wire.

We will begin by making a small chair. Take one end of the wire and, having measured seven-eighths of an inch, bend it sharply back on itself and secure it firmly at the end with double thread. Bend again at right angles and you have one back leg of the chair and the back of the seat, as in picture 1. Measure three-quarters of an inch and bend downward for the second back leg, which make double like the first, and sew tightly at the top.

Now turn the corner, and give seven-eighths of an inch to the side of the chair, then bend down sharply for a front leg, which should be a little shorter than the back ones, as the back ones, when finished, are curved slightly outward. The front of the seat is wider than the back; and as this, too, should be curved, an inch will not be too much for it.

CONTINUED FROM 1607

When we have done the second front leg, and turned the corner for the second side, we shall find

that we have come round to the starting-point. We must secure the wire at this corner very tightly.

Now we bend the wire upwards for the back of the chair. The back has a loop in it, which will need to be very carefully done, and secured at the crossing (see picture 2). When the back is firmly finished, we complete the framework of the chair by passing one row of wire entirely round the seat, and, leaving quarter of an inch to spare before cutting off the wire, we turn it round underneath the top of the nearest leg, and sew it down neatly out of sight. It is here that pliers are useful. By bending sharply backwards and forwards a few times, you can break the wire with

them, and leave only the covering to be cut with the scissors, which wire always spoils. With the pliers one can nip the end of the wire neatly under, instead of hurt-



The drawing-room set of furniture for the doll's house

ing one's fingers. The chair-seat is simply a piece of cardboard cut to the shape of the frame, covered with plush or satin, and neatly tacked round on to the wire, the stitches being kept on the under side.

We should start to make an armchair from a front leg, instead of a back one, so that when the four legs and seat-frame are complete we can start an arm shaped like picture 3. It is firmly fixed to the top of the back leg at the part marked x, and then the wire is carried upwards as before, to make the back.

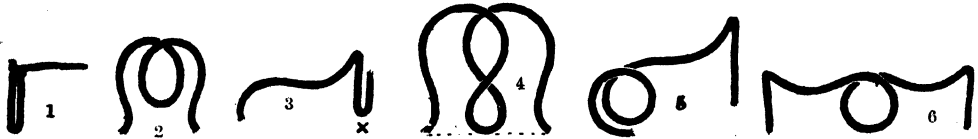
The back of the larger armchair has a double curve in it like a figure of 8, as in picture 4, and the bottom of the lower loop

THINGS TO MAKE AND THINGS TO DO

is sewn to the middle of the back bar of the seat. When the back is done, make the second arm to correspond exactly with the first, ending it opposite to where the other began; and the second row of wire round the seat finishes the armchair. The legs should measure the same as the small chair, but the seat is $1\frac{1}{4}$ inches from back to front, $1\frac{1}{8}$ inches across the back, and $1\frac{1}{8}$ inches across the front. The arm is five-eighths of an inch high where it joins the back, and the back itself is $1\frac{1}{8}$ inches high from the seat.

The sofa is made on the same plan as the

Now for the gipsy table. Start as before, and make a double leg $2\frac{1}{2}$ inches long. Carry the wire straight along for $1\frac{1}{2}$ inches; make a second leg, leave a second straight piece, $1\frac{1}{2}$ inches, then a third leg, and a third straight piece, then join this to the top of the first leg. We now have a triangle with three long legs. Bend the straight pieces until the triangle becomes a circle. Take the end of each leg with the pliers and twist it hard, until it has an ornamental twist for its whole length. Then bend all the legs towards one another under the table, crossing them in the middle,



Diagrams for making the drawing-room set of furniture for the doll's house

armchair, beginning at a front leg, but the arm at each end is more ornamental, having a turn in it, like picture 5. The back has a circle in the middle, and is curved like picture 6.

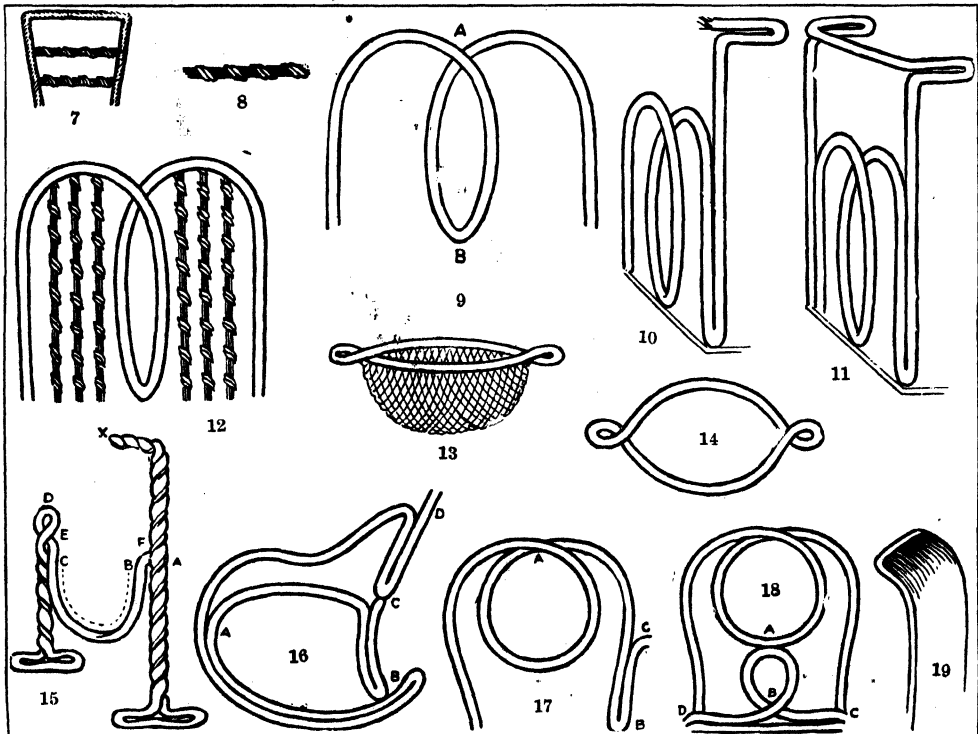
The seat of the sofa is $2\frac{1}{2}$ inches long in front, and rather less behind; from back to front about 1 inch. The circle is sewn to the middle of the seat.

The lady's easy-chair has no arms. It is much like a small chair, but has shorter legs, and a larger and broader seat. The back has one large loop, which reaches the back of the seat and is sewn down to it.

gipsy fashion, and fasten them very strongly together with needle and thread. The top of the table is a round of cardboard, cut to fit, and covered with black satin.

For our bedroom suite we shall require white silk wire of two sizes and a skein of white silk thread or a ball of any of the silk substitutes.

The small chairs, made of the wire at three yards a nickel, are very simple—a plain square back with two bars across it, like the little sketch (7) on this page. The bars are of twisted silk or thread, of which we want a coarse kind. We have it double, and push



Diagrams for making the bedroom set of furniture for the doll's house

MAKING A SET OF DOLL'S FURNITURE

the needle in underneath the back of the seat and up the back, where it will least show, to the spot where we wish the first bar to be. Then we carry the thread across to the other side and back again. Next we pass the thread round the bar thus formed, just three or four times to form a twist, draw it tight, and, sticking the needle in at the opposite end of the bar again, we bring it out about a quarter or three-eighths of an inch higher up, where we want the second bar to be. This we make in the same way. If it is nicely done, it should be quite a little ornamental twisted bar, like picture 8.

When this is done, pass the needle down so as to get the fastening off behind a back leg, or somewhere where it will not be seen. The chair-seat may be either white or colored, in silk, satin, or sateen of any sort you think pretty, stretched over a piece of card, as in the chairs already described.

The bedstead is made of thicker wire, at a few cents a yard. It will take nearly a yard and a half. We start as for a chair, at the back leg. The legs are three-quarters of an inch high, the ends $2\frac{1}{4}$ inches long, and the sides $3\frac{1}{4}$ inches long.

When the legs and sides are done, we find ourselves back at our starting-point, and, having secured the wire very firmly, we begin the head of the bed, by turning the wire upwards and forming two curves with a loop in the middle as in picture 9. The top of the loop, A, where the wire crosses, must have some firm stitches with double thread, and the bottom, B, must be strongly fastened to the exact centre of the framework between the back legs. This loop should be about $1\frac{1}{2}$ inches high.

This done, carry a line of wire up the end of the curve and about $1\frac{1}{2}$ inches above it; double back for half an inch, and bend the doubled part at right angles as in picture 10. This is the "Italian" shaped top on which to hang lace curtains. Then carry a bar across, an inch above the top of the back to the other side, make another half-inch projection to correspond, and take the wire downwards, along the other end of the bed-head, as shown in picture 11.

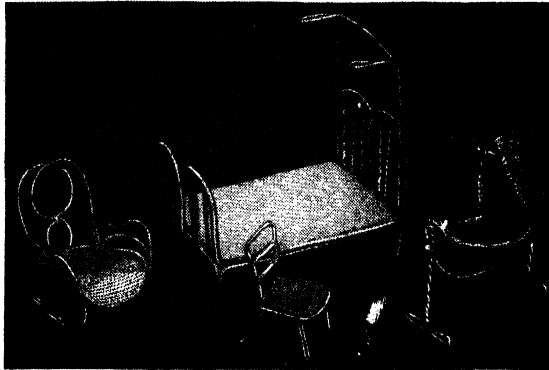
Carry a second line of wire along the side of the bed and form the foot, like the head, but half an inch shorter, and without the top; bring the wire up the other side of the bed, and finish off under the corner by a back leg. The bars which fill head and foot are made just like the chair-bars, three in each loop, at equal distances, as in picture 12. Lastly, cut a piece of card exactly to fit the framework of the bed, cover neatly in white sateen, or other material, and fasten it to the ends

and sides of the framework. We must take pains to make the bedstead stand quite firmly, and must pull and bend and coax it until it does this.

The baby's cot is shaped like picture 14, with a bag or net sewn all round it, like picture 13. Make a stand for it like picture 15. Starting at point A, with single wire, come downwards to the foot. Having formed this, we go upwards, twisting the two wires, to A again, past A right up to X, turn back and come down to A, yet again twisting the wire. At A turn off and bend the loop B to C. Then form the knob, D, and, coming downwards, make the second foot the same size as the first, to stand exactly opposite to it. Then go up again, twisting the double wire to D, and finish off there.

The loops at the ends of the cot are sewn to the two standards at E and F, or just to clear the loop B to C. The taller standard, which should have an entire height of about $3\frac{1}{4}$ inches, must be bent at right angles about three-quarters of an inch from the top, to form a support for the curtains of lace edging which shade the cot. A rocking-chair makes a charming

little addition to the furnishing of our bedroom. It is made in the thinner wire. Start with the back legs, which are about as long as ordinary chair-legs, and the back of the seat a full inch wide. The arm and rocker come next. Having sewn well the top of the second back leg, turn from it a big curve, doubling the wire and re-



The bedroom set of furniture for the doll's house

turning as shown in picture 16, securing the wire at A, and sewing the leg to the rocker at B. Then, having formed the arm, turn sharply down to meet the top of the back leg again at C, and double back to D, where it must be sewn again. From D form the upper part of the back, as in picture 17, stitching firmly at A. When we reach B, and secure our wire, we shall have to make the second arm and rocker by turning back to C, being very careful that these correspond *exactly* in size and shape with the first.

We shall now find ourselves back again at point B, in picture 17, from which we start to make the lower part of the back, shown in picture 18. Sew at A, B, C, and D, then all we have to do is to carry the wire round to form the seat on the inner side of the rockers, and finish off just over the point where we began.

We must be careful to shape the cushions to fit the seat-frame, tacking it round to show the frame in front, then bend the front of the seat slightly over, as in picture 19.

Later on we shall learn how to make the furniture for two more rooms—the dining-room and the kitchen.

FLOWER-POTS MADE FROM OLD TIN CANS

OLD tin cans are usually thrown into the dust-heap after they have served the purpose for which they were originally intended. But there are many uses to which they may be put, and we shall see in this article how they may be utilized instead of being thrown out as valueless.

One of the most convenient uses to which they may be put is to serve as flower-pots, either singly or arranged suitably. In this article are several illustrations showing old tin cans adapted for flowers, and with a little explanation the adaptation and ornamentation are easy to understand.

The tin cans most suitable are round fruit cans of a capacity from a quart upwards. They should also be deeper than they are wide, but although cans of this size and shape are the best for the purpose, cans of other shapes, such as square and oblong, can be used if the others be not available.

For flower-pots the cans should have the bottoms pierced, because a flower-pot made from a tin can must have means of drainage just as well as an ordinary earthenware flower-pot. The usual hole in a flower-pot is round and in the centre of the bottom. We may make the holes of our tin can flower-pots like this, but to make a number of small holes is much easier than to make one large hole. By taking a sharp nail—say, a three or four inch wire nail—and a hammer, we can easily



2. Cylindrical flower-pot made with tin cans



1. Tin can flower-pot, with pine-cone decoration

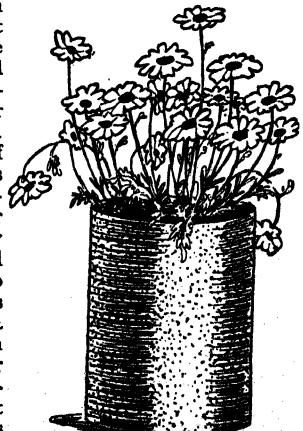
make a few holes in the bottoms of our old cans. We must turn the cans upside down in making these holes, so that the ragged edges we make will be inside the cans, and not outside, where they would be apt to mark or

tear anything upon which they were placed. We might as well understand the reason why holes are necessary in flower-pots. If there were no holes the water would not be able to run away, and if the same water lies in the

can it makes the earth in the pot sour, so that the flowers languish and die. Having made the holes, we think now about the appearance of our flower-pots.

We purchase some asphalt—say, about seven pounds—and melt it over a fire, using any old pot for the purpose. We must see that the pot has no holes in it, or the asphalt may run out into the fire, and that would make trouble. It is well that the asphalt should be as thin as possible, therefore we had better have it boiling. When it has reached the boiling stage we remove it from the fire and dip the tin cans in one by one. We may manage it all right with just a stick for taking them out again, but we can tie a string to one, threading

the string through one of the holes that we have made in the bottom and taking care that the other end of the string is not allowed to get right into the hot asphalt. We also want a box containing clean dry sand, and as we take the cans from the asphalt pot we put them at once into the sand, rolling them over well and putting the sand inside also, making certain that every part of the surface both inside and outside has received a proper coating of sand. The purpose of the asphalt is not for ornament only, or that it may cause the sand to adhere to the tin. It gives the tin cans a coating through which water cannot penetrate, so that cans treated as we have here



3. A simple tin can flower-pot

FLOWER-POTS MADE FROM OLD TIN CANS

described are not liable to rust, as they would be if used without the asphalt coating.

Other things may be used instead of sand; for instance, dry packing moss as used by florists or dead leaves may give a very good effect. If we wish to use this, we put it on exactly as we have described in the case of the sand. When the asphalt has become hard, which it does very speedily, we find that we have a very presentable flower-pot, and one that we can use exactly as we would use an ordinary brown earthenware flower-pot.

Now let us look at the pictures. In picture 3 we have a flower-pot made exactly as we have described, and picture 1 shows a hanging flower-pot made in the same way. In the latter case there are two festoons of pine-cones around the body, and these give it a very appropriate decoration.

Picture 4 is a similar hanging pot sur-



4. Tin can flower-pot covered with virgin cork

rounded by virgin cork, which can be purchased cheaply from most seedsmen. The

virgin cork is simply placed around the can, and a few thin wires tied around the whole body to keep it in place.

Picture 2 shows a hanging flower-pot of a different shape. Here two round tin cans have been slid into each other after having had a space cut out of the side of each. The bottoms of the two cans form the ends of the cylindrical pot.

For out-of-door flower-pots, for ferneries and rockeries, and for flower-stands the tin can flower-pot can easily be pressed into service by anyone who has a little ingenuity, and who has learned how to prepare the simple flower-pots we have described.

Before putting in the earth, we should put broken crockery in the bottom of the cans about two inches deep. Then the earth is put on the top. If the pots are used in a room, we should take them to the pantry or bath-room when we wish to water the flowers, and after watering them it is well to allow them to drip for half an hour before replacing them in the room.

THE VANISHING PILLAR TRICK

VERY simple materials are required for the performance of this very effective trick. The pillar is a block of solid boxwood, a little over 2 inches in height and shaped as in picture 1. With it is used, unknown to the company, a little cap, B, of the same material, and of such a size as to fit closely, but not tightly, on the rounded top of A. Whether B is on or off, the appearance of the block is the same.

When you desire to show the trick, you secretly tuck B between the roots of the first and second fingers of the right hand, convex side inwards. Exhibiting A, you invite the company to assure themselves that it is just what it appears to be, a plain solid block of wood. When it is given back to you, you take it in the right hand, and in so doing slip the little cap over its upper end, and show both together, as being merely the block which has just been examined. You then take them in the left hand, small end uppermost, curling the thumb and forefinger round B, as seen in picture 2, but leaving it, still visible, so that, to the eye of the spectator, the block as just seen is still in the hand. As a matter of fact, however, in withdrawing the right hand you carry off the block with it, and drop it into a convenient

pocket. You now announce that although the block is made of boxwood, which is one of the hardest woods known, you can, by the aid of a little magic, compress it so as to reduce it to half its size, or even less. Suiting the action to the word, you bring the hands together, and make a pretence of squeezing vigorously. Under cover of so doing, you insert the tip of the little finger of the right hand into the cap, which thenceforth remains on it, thimble fashion. Still keeping up the squeezing movement, you say: "It is getting smaller, smaller, smaller. I have made it so small that it has disappeared."

Opening the hands, you show that they are empty. The boxwood cap is, by artificial light, so nearly the color of the hand as to be practically invisible, and if the hand be kept in gentle motion the keenest eye will not detect its presence.

If the cap be found too loose a fit for the little finger, one of the other fingers may be used instead. The first attempts of the novice at practising the trick will quickly show him what suits him best in this particular. The block and cap can be purchased for a small sum.

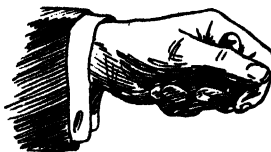


B



A

1. Pillar and cap



2. Holding the cap

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO AT THE END OF SEPTEMBER

SEPTEMBER is a terrible month for weeds, therefore the hoe must be used so frequently that they never attain to their flowering and seeding stage. Really, weeds are very little trouble if they are attended to while quite small. We must remember that not only are weeds unsightly when growing among our flowers, but also that they are depriving our garden plants of a portion of the goodness and nutriment of the soil.

If possible, we should begin our autumn planting about this time. To find room for it we may uproot any *annual* plants that have finished flowering. Even if left, they would die before the winter, so that if their beauty is gone, they are better taken away, for they, too, are using up the goodness of the soil.

Probably you sowed the seeds of sweet-william, canterbury bells, and perhaps forget-me-nots, and now have a quantity of young plants that, during the summer, you have been growing in some spare piece of ground, or even in boxes. All of these may be planted in your little plots as soon as you can find room for them, and they will make the plots bright and beautiful next spring. The polyanthus, too, if these were removed to make more room for your summer-flowering plants, and have been kept growing in some cool, moist spot, may all be brought back at the present time, and replanted in the little gardens. At this season you will scarcely need to water your plots at all, for beside

the rainfall there are heavy dews night and morning, and these give quite sufficient moisture at this season, but pot-plants will need regular attention, though even they will require less water than was necessary a few weeks ago. The chief thing to aim at now, so far as the appearance of the little garden goes, when everything is getting rank and overgrown, is neatness—plants may need an extra tie to keep them from overhanging and invading others. Edges should be kept clean and very tidy, and plants may even need reducing somewhat to keep them within bounds.

There is a very delightful bit of autumn gardening that awaits us now, nothing less important than the planting of the bulbs out of doors. Here in America we are often tempted to put the work off until November is half through, and even later than that; but in Holland, the great land of bulbs, they do the work quite early. We can easily see the wisdom of thus taking time by the forelock, as the good old saying has it. If we take up a bulb that has been in the ground ever since it flowered in the early spring—a snow-drop, let us say—and examine it at the end of August, we shall see that already it has made

quite a considerable quantity of roots; it is growing quietly and slowly through the long months that lie ahead of it before it is due to flower. If you shorten this period of quiet growth by many weeks, you cannot expect sturdy plants.

There is another point also to consider. The bulbs we buy at this season have been removed from the soil for a long time already, and it is well known that some varieties deteriorate if kept out of the ground more than a certain time. With all these things in favor of early planting, we find the wisdom of "taking time by the forelock."

In these days nearly every kind of bulb is much cheaper than it was some years ago, and it would seem that every season they grow cheaper. It may help you if I show what three dollars will procure in bulbs for autumn planting during the next few weeks.

One hundred crocuses, mixed colors, for 60 cents. Fifty pheasant's eye narcissi for 50 cents. One dozen fine double daffodils for 50 cents. One hundred Spanish irises for 30 cents, mixed colors. One dozen alliums,

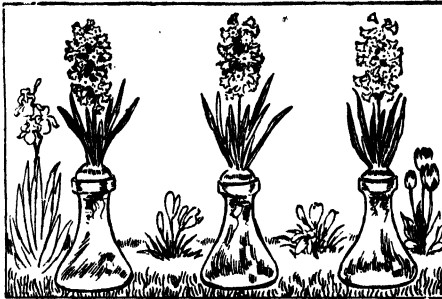
yellow flowers, for 25 cents. One dozen fine mixed parrot tulips for 15 cents; and one hundred French ranunculi for 50 cents, mixed, and beautiful Japanese lilies, called *Lilium Speciosum*, for 25 cents each. One should also have some lilies-of-the-valley for shady places, and one or two of the tall crown-imperials.

There! with numbers such as these, who

would not save up pocket-money to have a fine show of bulbous plants?

As soon as the space can be found for them the other bulbs may be planted, but the ground should be dug over first. It is a very bad method to use a pointed stick, or, indeed, a stick at all, with which to make the holes for the bulbs to lie in. A trowel or little fork should be used, because, in the case of the stick, there may be left a space between the base of the bulb and the bottom of the hole, and this is not at all to be desired—the *base of the bulb must be quite firm on the soil.*

Some people take the precaution of putting sand in the hole for the bulb to lie on, but, except in cold, wet soil, it is unnecessary for the hardy bulbs mentioned above. It is not difficult to determine how to place the bulb; the flatter end should lie downwards. There is an interesting method of growing bulbs, and especially hyacinth bulbs, in water. Single varieties should be chosen, and the water in the hyacinth glasses should be rain-water, just touching the bulb. The water should be changed occasionally and should be filled up as it diminishes. Add charcoal to keep the water sweet, and keep the bulbs in the dark.



HOW TO CARE FOR GOLDFISH

OF all the pets, these golden fishes are apt to suffer most from neglect. They have no way of calling attention to their troubles except by hanging like tassels from the surface, where the air contains most oxygen, their sides heaving with the efforts of the gills, while the fish pant loudly, poking their noses quite out of water. Children forget to change the water, or to feed them, and are surprised when they find them floating upside down some morning, quite dead.

Among the most common causes of death are too little water and too small quarters, and too much sun also. This explains why picturesque globes should be avoided, or at any rate kept out of strong sunshine, for the curved sides collect the sun's rays and fairly scald the helpless fish. An oblong tank, made of one piece of glass, is easy to handle when empty, cannot leak, allows one to see the fish clearly, and does not break unless roughly handled. One holding about three gallons is of a handy size in which several fishes two inches long may have swimming-room. Other aquaria, made of plain pieces of glass, on at least two sides, fastened together with wood or metal at the corners, are not so easily handled and are apt to leak. The cement used must be carefully chosen or when dissolved by water it will poison the fish.

Whatever may be the form of tank chosen, it must be absolutely clean, and every trace of soap rinsed away. The carpet of sand also should be thoroughly washed and should not be that from the seashore, which is hard to rid of salt, but from bank or fresh-water stream. A little soil, also cleaned, may be used if well covered with sand, but is scarcely necessary, as the aquatic plants which we are going to insert need nothing but water.

These plants, growing in sunshine, exhale oxygen. In warm weather one can often see the leaves and stems beaded with silvery drops of gas which continually disengage themselves, and rise to explode near the surface. This oxygen, freed in the water, is absorbed by the blood of the fish as it flows through the gills. The carbonic acid gas which is thrown out by the fish, is essential to the growth of the plants, which seize upon it throughout their whole surface, assimilate the gas, and decompose it, extracting the carbon, rejecting the oxygen. This is done by the green parts of the plant containing chlorophyll, rendered active by light, and most so by sunshine. Tiny pores, or stomata, allow the rejected oxygen gas to escape from the cellular tissue, to be captured by the fish, as we have seen, thus completing the circle of usefulness.

Given plenty of plants to furnish oxygen for the animals; enough water to store it in (about a gallon for each fish); enough animal life to void carbonic acid gas to supply the plants; and with sunlight to act as motive power, one can readily see that

the water in the tank should remain in perfect condition and the whole affair be "balanced," as in a natural pond.

Aquatic plants may be bought from florists or dragged from brooks and ponds. The water from which they are taken must be pure, not containing sewage or dead fish, for deadly poisons may be carried in this way. Several kinds are suitable for aerating the water. A common one is the water-thyme, or *Anacharis*, a long weed with whorls of small simple leaves, growing rapidly. Frail horn-worts with thread-like foliage stream down the currents, and skeleton-like Characeae lie in quiet eddies. Small pond-weeds, the tiny duckweeds, which float in a green scum on ponds, the long narrow leaved tape-grass that swimmers dread, but which is one of the best air-giving plants a tank can have, and, in fact, any plant found growing in a stream will add beauty and profit to the tiny pond we are building. While we are searching for plants we may also look up some snails. Generally some will be found in shallow quiet streams or even ditches, crawling on stones or grasses. Their shells are very fragile and must be fingered gently, and they must immediately be put into a pail or jar of water. The plants will do better, too, if they can be dropped into water. If they are not wrapped up, at least, they will dry into strings.



Water-thyme (*Philotria Canadensis*)

Plenty of snails should be taken (or if none can be found some pretty round fellows can be bought of the fish dealers), for fish like a change of diet and will probably drag the snails out of the wide doors of their shell-homes and eat them. They are very necessary, for they clean up all sorts

of minute plants and animals in our artificial pond, just as they do in the real one. We shall see them painstakingly wiping off the scum on the glass sides of the tank as they crawl over them with slow-dragging "feet," working their rasping tongues at the same time. They will also lay eggs in



A little pond weed

masses of jelly, but if the fish find them out none of the tiny snails will escape.

When all this plunder has been carried home it should be put into water with a hint of salt, and allowed to soak for a while, then rinsed. The cleaned sand is placed in the bottom of the tank, and some of the biggest plants are anchored in it along one side. This will be the back of the aquarium—a background for the golden captives. Little pebbles and smaller plants may also be put in, leaving a clear playground for the fish, then some water may be added with a sprinkling-pot. We then see how much air is forced under the water in this way. The plants will float out and we can rearrange them if we like, for they are more easily managed than when they fell over limply. Finally the tank, which, by the way, should be in the position where it is to stay,—the best place being in an eastern window not too close to the glass for fear of frost in winter, and where the morning sun can cover it for few hours,—may be filled with water. It is then too heavy to move.

The snails can now be slipped in and the whole thing left for a few days. The early morning sun will start the plants a-growing, bubbles will rise to the surface, and soon we can put in the fish themselves. If the tank cannot be in an eastern window a southern one is probably the best, although during the hot hours in summer the sunshine must be cut off or the fish will faint and perhaps die. In fact goldfish stand cold much better than they do heat, and the best time to start an aquarium is in the fall. Oxygen seems to escape more quickly in

summer than in winter, but of course the plants will not grow so well when the sun is faint.

Although, if we are successful, we shall not need to change the water in this "balanced" tank, we shall want to clean up the refuse that collects at the bottom of the tank. This is best done with a siphon, or long tube, one end of which is in the water while the other hangs lower. We suck the air out of this latter end and the water rushes in to take its place, and keeps running as long as the two ends remain the same or until something fills the tube. The lower end must be so placed that the stream through it will fall into a dish. A little experience will enable us to steer the end that is under water over the soft heaps of dead foliage and rejected food that lie in corners and hollows behind plants, especially in the morning before the fish have stirred them up. It is amazing to see how quickly this refuse disappears into the tube and how easily the sand can be left in the tank (if the tube is not more than a quarter of an inch wide). We must be careful to avoid pulling up the plants, however, or jerking innocent snails out of their shells. The siphon's current is surprisingly strong, and would doubtless pull out a fish's eye, or injure its tail, so that the fish must be carefully avoided. They, fortunately, usually scurry away when they first feel the tugging water at their fins.

So much water is pulled out by the suction that the amount left in the aquarium is naturally reduced, and one may wipe clean the exposed glass, before replenishing it. In this way the water is really constantly changed, without disturbing either plants or fishes. In summer, nevertheless, the water should be still more frequently aerated, by lifting it out in handfuls, and dropping it back, in splashes. Warm water parts with its air more easily than cold water does, and the fish are grateful for the air absorbed by the fountain-like spray.



A moss-like water weed

When handling goldfish, it is well to remember that their scales are a valuable protection for them, and that a weak spot in their armor may mean a chance for a deadly fungus to insert itself. The slime further protects a fish from injury, oozing out of

its skin; and, if possible, should not be rubbed off. A little scoop-net is generally used in shops for removing the fish from large aquaria, but I have found the hand to be the safest instrument, especially for the fragile-finned varieties.

There is an insidious fungus disease, flourishing on dying fishes, which attacks

For one reason they feed chiefly on vegetable food, although many of the prepared foods contain insects or their eggs, and I suspect some of them also contain crushed dog-biscuit. Breadcrumbs are often fed to them but are likely to melt in the water and render it unhealthful. In fact we must be very careful to give them only tiny portions of food and once a day is often enough, for they do not like left-over food and it may foul the water, when it rots behind the plants.

When the sun starts the plants to growing in spring we may find the water growing green and thick. This is because millions of tiny water-plants too small to be seen without a glass are also growing there. They are really a sign that the water is pure, but the water does not look nice and the fish seem to have difficulty in swimming and become scarcely visible. Although they probably like their green shadowy home, we do not, and therefore we shall take out more water than usual when we clean up, and put back plenty of it, cold and clear. Generally the green gradually disappears, especially if we shade the tank during the heat of the day. At any rate the water will clear in the fall. So long as the fish are swimming quietly around, the plants are growing nicely, and no bad odor arises from the water we may assume that everything is all right and leave the fish and tank alone. They will do much better if the tank is never touched except for cleanliness' sake.

Sometimes we find that we have specimens of both sexes of fishes in our tank, and rarely, if conditions are to their liking, the female will lay eggs. These are globular and translucent affairs, and catch like seed-pearls on all the plants. The male, who is never so gorgeously tinted as at this time, also wears white furry spots, and throws out a milky fluid, for the purpose of fertilizing the eggs. This "milt" however sadly fouls the water, so that after the egg-laying is finished, in a day or two the tank must be emptied and refilled. If we want to raise little gold-fish, we must quickly take the eggs out on their sprays of water-weeds, and establish them in a little aquarium by themselves, for the parents otherwise will nose them out and eat them up, precisely as they do the egg-masses that snails patiently deposit on the tank-walls. If we keep the little tank and its plants where it will get plenty of sunshine in the morning, but not so much as to over-heat the water, we may find some queer little squirming forms, all eyes, wriggling about. They will snap at the minute bits of hard-boiled egg-yolk, crushed fine, with which we feed them, but so much will be wasted that the water must be changed every day, to get rid of the decaying food. We must be careful that the fresh water be no colder than that taken out. If everything goes well we may raise some funny little finny creatures, which will eventually eat their parents' food and grow to their parents' size.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 1849.

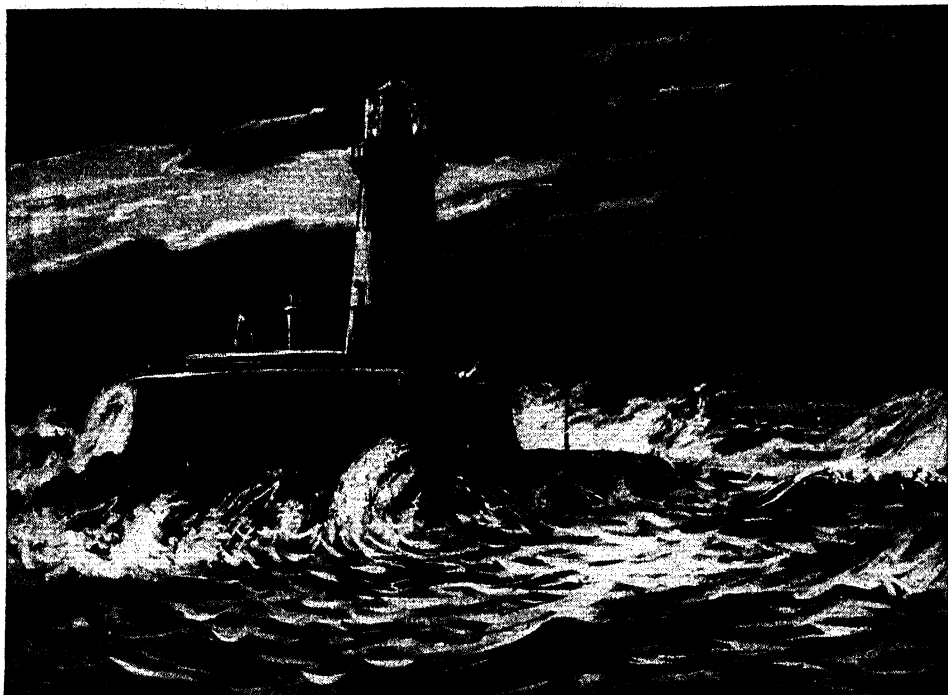


Tape-grass (*Vallisneria Spiralis*)

weak or wounded fish, and gradually destroys them. It is this fungus which we are endeavoring to keep out, when we scrub everything so vigorously, and which we dread when bringing in new fish or plants. Such should really be quarantined. The disease manifests itself by pale patches on the fish's scales, looking rather furry, and it sometimes covers the eyes with films, or eats away the fins and tail. If this horrid disease appears in the aquarium, everything but the fish must be thrown away, and they must be slid into a shallow bath of salt water—one teaspoonful of salt to a gallon of water. The snails, too, if one wishes to save them, must go with the fish, and there all will have to stay until they are clean again or die, which is more probable. The tank itself will have to be scoured anew. It is best to buy fish from reliable dealers only so as to avoid getting this disease, if possible.

There are many lovely varieties of gold-fishes, some having long and broad filmy tails that mermaids must covet, and it seems better to keep them in a tank by themselves.

THE HEROINE OF LONGSTONE LIGHTHOUSE



THE LIGHTHOUSE ON FARNE ISLANDS FROM WHICH GRACE DARLING ROWED TO THE WRECK



Grace Darling was one of the bravest girls who ever lived. Her father kept the lighthouse on Farne Islands, where, in the stormy night of September 6th, 1838, the steamer *Forfarshire* was wrecked. Through that bitter night nine men and women clung to the wreckage as it tossed on the rocks, swept by the waves and buffeted by the storm. In the morning, as soon as it was light, Grace Darling mounted the lighthouse tower with the telescope. On the rocks in the raging sea she saw the wreck. She launched the lighthouse boat, and, with her father, rowed through the storm to where nine people were in peril of their lives. They reached the wreck and brought the sufferers back in safety to the lighthouse.

The Book of GOLDEN DEEDS

WHAT THESE STORIES TELL US

WE read of many kinds of heroism in these stories. The first tells us of a girl who made her name ring through the world in a single day—Grace Darling, who faced an angry sea and risked her own life to save the lives of many who were perfect strangers to her. We read again of a boy who saved the whole of his family by bearing pain bravely. Another story tells us of a faithful Chinese servant who saved his mistress and her child from the hands of wicked men, and starved himself to give them food; and still another tale is that of a merchant who saw a man drowning and jumped into the river to save him, to find that he was saving his own son. Such stories help to make us brave, and to understand the goodness that is in the world.

THE HEROISM OF GRACE DARLING

A FAST rising storm overtook the steamer Forfarshire as she reached the open sea off Spurn Head on September 6th, 1838, on her way from Hull to Dundee.

In the fairest weather this ship, with her leaky boilers, was none too safe, but as the storm gathered in fury, and she rolled and tossed amid the mountainous seas, her boilers were strained, and great rents were made in her sides, through which water poured and put out the fires, making the vessel unmanageable. The crew tried to use her sails, so as to keep the ship out at sea, but they were quickly blown to shreds. As night fell, they tossed and drifted in the dark at the mercy of the storm, and at midnight the great Farne light, off the Northumberland coast, was seen, warning them of their terrible danger. For at this point rocks that go down a hundred fathoms deep lie off the coast.

Upon these rocks the ship, with her terrified crew, was dashed and cut in two. The stern sank in deep water with over forty souls; whilst the bow, with nine sailors and passengers clinging to the wreck, was fast on the rocks, swept by the waves and buffeted by the storm.

It is easy to imagine their terror as they clung there, waiting for the dawn and praying for help. As the dawn broke they could see, a mile away, the Longstone lighthouse, built on the outer island of the group, where a weather-beaten old sailor,

CONTINUED FROM 1673



named Darling, tended the lamps, living with his wife and his daughter Grace. Neither of these three had slept through the night, for the waves had been thundering upon the rocks and dashing over the lantern

high above the sea.

When it was light enough, Grace mounted the lighthouse tower with the telescope. Far away in the raging sea were the nine poor souls clinging to the wreck. Knowing full well that, with a rising tide and the storm still growing, they must perish, the brave girl determined to try to save them. Her father and mother tried to persuade her not to go out to what seemed certain death, but she said: "If father will not go with me, I will go alone." Seeing that she was so determined, her mother helped to launch the lighthouse boat, in which the brave girl and her brave father rowed towards the wreck and the men who were in such dire peril of their lives. Undaunted by danger, battling with the winds and the angry waters, they at last reached the wreck, and brought the sufferers back in safety to the lighthouse.

The story of Grace Darling's heroism spread quickly through the country and through the world. Generous people sent money and presents to the brave girl, whom many people came long distances to see. But she lived only four years after this to enjoy her fame and good fortune, and when she died they laid her to sleep within sight of the scene of her golden deed.

THE MAN WHO SAVED HIS SON

A FRENCH merchant named Labat was taken ill in the early years of the last century, and retired to a beautiful country house on the banks of the River Adour. Here, one morning, his gaze was attracted by a rider struggling with a restive horse on the opposite bank. The old merchant, who was wearing a dressing-gown, peered across the distance, and watched the battle between man and horse with anxious eyes. Suddenly he was horrified to see the rider hurled violently from the back of the plunging horse, and thrown into the river.

The merchant never hesitated. He forgot his age, his illness, his comfortable house, his own safety, and, hurrying down, he dived in after the drowning stranger. Such is the call of Humanity.

He was a good swimmer, but the heavily-booted horseman was hard to save, and it was only after a terrible struggle that the merchant succeeded in bringing him safely to shore.

Then, with a cry which must have startled the morning echoes, the grand old merchant exclaimed fervently:

"Sacred Humanity, what do I not owe you? *I have saved my son!*"

THE SERVANT WHO SAVED HIS MISTRESS

ON a small island off Australia, inside the Great Barrier Reef, North Queensland, an Englishman was one day obliged to visit a distant town for supplies, leaving his wife and their baby in the care of their Chinese servant.

While he was away, the servant came in great alarm, saying that the natives, who were very fierce and cruel, had come from the mainland, and were marching down the island towards their house. What could be done? There was no hiding-place on the little island, and the master had gone away in the only boat. The Chinaman hastily launched a huge copper vessel used for cooking, helped

the woman and child into it, and, taking a jug of water and a little food, paddled away to an uninhabited islet, three or four miles distant. From there they saw the natives destroy the little house.

So long as she lived the woman kept a diary of events, writing how the Chinaman made them as comfortable as possible, and how finally, after many days of denial, he went off by himself and hid in the bush, where later he was found, starved to death, wrapped in his old ragged quilt.

Alas! before help came, the mother and her babe died, too; and all were found, with the diary that told the story.

THE BOY WHO SAVED HIS FAMILY

ABOUT two hundred years ago, the Huguenots, who were the Protestants of France, were being bitterly persecuted for their religious beliefs. In the village of Thorigne lived a weaver named Daniel Bonnet. He had a wife and three children, the youngest being a little boy of five years old.

As they were Huguenots, suffering great hardships, they decided to leave France and go to America, where they would be free to worship God as they liked.

When all was ready they started off; but in order to get away safely they put their three children on the back of a donkey and covered them over with vegetables. Then they set off as though they were going to market; for if it had been known that they were leaving France they would have been stopped.

Not long after they had left the village, one of the soldiers saw them, and, suspecting that they had hidden

their children under the vegetables, he rode up and said with a sneer: "Going to market, are you? Then I will try if your carrots are tender." With that he drove his sword into the load on the donkey's back with all his might, but, hearing no sound, he thought he had made a mistake, and galloped off.

We can imagine the agony which the poor parents felt. They dare not stop to see what had happened, but had to go on until they were far away from everyone, and out of sight. When at last they took off the vegetables, they found their little boy had been stabbed through the thigh. The little fellow looked up at them, and said with pride: "But I did not speak, mother," and then fainted away.

Thanks to his courage, the family were able to escape across the sea, and to found a new home in a happier land.

THE NEXT GOLDEN DEEDS BEGIN ON PAGE 1819.

The Book of MEN & WOMEN



DEFOE



SMOLLETT



STERNE



RICHARDSON



BUNYAN



SWIFT



FIELDING



GOLDSMITH

THE GREAT STORY-TELLERS

WRITERS OF THE SEVENTEENTH & EIGHTEENTH CENTURIES

MEN and women had been telling stories long before any of the writers we are going to hear about were born. But it was not until the beginning of the eighteenth century that the art of telling a long story in the form of a novel began to be practised by English writers. On page 1223 we read about "Robinson Crusoe," which was first published in 1719, and this was really the beginning of what we may call modern story-writing. As we know, that immortal story was written by Daniel Defoe; but when he was a youth of seventeen there was a rough preaching man in gaol at Bedford, who was occupying his time in writing a story of a very different kind, which has made his name even more famous than that of the author of "Robinson Crusoe."

This man was John Bunyan, and we have read all about the wonderful story he wrote in the STORY OF FAMOUS BOOKS on page 1125. There were many story-writers before John Bunyan, who, like him, told their tales in the form of allegories; but we need not concern ourselves with them. Bunyan is the first story-teller born in the seventeenth century to whom we need pay attention.

CONTINUED FROM 1683



What sort of man was he, we may ask ourselves, who wrote the wonderful "Pilgrim's Progress"? When we turn to his great book we find it written with so much grace of language and beauty of thought that we might suppose its author to be a scholar of wide experience and culture did we not know that his father was only a poor tinker, or mender of pots and pans, and that he himself had followed the same trade.

He must therefore have been what is sometimes called "one of Nature's gentlemen," for of education and training in the gentle habits of life and thought he can have had none at all. Indeed, we know for certain that in his youth he was rough and thoughtless, wasting his time like most of the heedless village youths of his acquaintance. The descriptions of him, and his familiar portraits, show him to have been strong and lusty, and not exactly the style of man whose heart one would have expected to be tender with love for his fellow-men, his soul simple and steadfast for truth and righteousness.

Bunyan was born in the year 1628, and seventeen years later he left his pots and pans for a time to serve in

JULIUS CAESAR

HERBERT SPENCER

the army, returning in about a year to his native town of Elstow, near Bedford, where, soon after he was twenty years of age, he married a poor girl about whom we know very little, except that she died in 1665 and left her sorrowing husband with four little children.

**JOHN BUNYAN, THE ROUGH PREACHER
WHO WROTE "THE PILGRIM'S PROGRESS"**

Perhaps it is to this almost unknown wife of his that something of his fame is due, for if before his marriage he had led what to him seemed a very rough life, soon after it he began to sober himself and to think deeply about religion. His wife had brought him nothing in worldly goods, but among her few poor possessions were two religious books of the time, the reading of which turned his thoughts to better things, and may possibly have given him the idea of his own later writings.

Bunyan began to go to church regularly, and soon felt himself compelled to preach the Gospel that had now brought so much peace to his troubled mind. This was in the days of the Puritans and the Commonwealth; but no sooner had the unworthy King Charles II. come back to the throne than preachers who did not belong to the State Church were subjected to the cruellest persecution, and in 1660 Bunyan was arrested and thrust into the county gaol at Bedford for no other offence than the crime of preaching the simple truths of the Gospel.

For twelve long years was he kept a prisoner. Yet his time was not wasted, for during those years he contrived to write many religious works, and particularly one, called "Grace Abounding," in which he tells us his inmost thoughts in a way that no other Englishman has ever revealed himself.

**HOW THE TINKER'S SON BUILT UP HIS
FAME IN BEDFORD GAOL**

When he was liberated, in 1672, he became a licensed preacher, and was chosen as the pastor of the church to which he had belonged. Three years later he had to suffer imprisonment in the town gaol of Bedford, but for six months only, and it was now that he wrote the first part of "The Pilgrim's Progress."

No persecutions could destroy his faith in the true Christian religion, the

preaching of which by tongue and pen had been his one thought from the time that he had given up his rough life. The fame of his great book in his own day was immense, and when he died, in 1688, during a visit to London, the tinker's son of Elstow had done more than all King Charles's bishops to turn the thoughts of the people to God. Though he has been dead for two centuries and a quarter, his voice still speaks to us in "The Pilgrim's Progress," which has been translated into more than eighty foreign languages.

Daniel Defoe, the author of the immortal "Robinson Crusoe," is another example of the fact that humble birth is no bar to the greatest achievements. His father, whose name was James Foe, was only a butcher in the parish of St. Giles, Cripplegate, London, and Daniel, who did not alter and dignify his family name until he had reached middle life, was intended to become a minister of one of the Dissenting churches, and at the age of fourteen he went to Newington to study.

**THE SCHOOLDAYS OF THE MAN WHO
WROTE "ROBINSON CRUSOE"**

There he learnt Latin, Greek, French, Spanish, and Italian, in addition to the usual religious studies, for he was an extremely bright and receptive scholar. But despite all these accomplishments he very soon changed his mind, and instead of going in for the ministry, decided to become, of all things, a hosier. This was when he was twenty-four years of age, and before he had begun to write.

It is rather difficult to imagine the author of "Robinson Crusoe" in the shop of a London hosier, supplying customers with stockings. But he had a soul above hosiery, this brilliant scholar and fiery politician, who could not well keep silent in those days when so many public abuses had still to be remedied.

That was the great age of the pamphleteers, or writers who addressed the public on questions of the day in small pamphlets, which were sold in the streets, as the newspapers with which we are now so familiar were small and few in number. So when Daniel Defoe wanted to tell the public something which was burning in his own mind he wrote and printed a pamphlet, and it so happened that one of these pamphlets was considered to contain a libel on the Govern-

ment of the day. It certainly spoke very freely about the manner in which the Church of England was conducted, and voiced the opinion of a great many people in England.

For the writing of this outspoken pamphlet Defoe was made to stand in the pillory, but the people, who sympathised with him, made his intended punishment an honor by decorating the pillory with garlands of flowers; and, fortunately for him, the authorities did not proceed to the extreme measure of cropping his ears—a punishment which happily for him had ceased to be inflicted upon political prisoners who were sentenced to stand in the pillory.

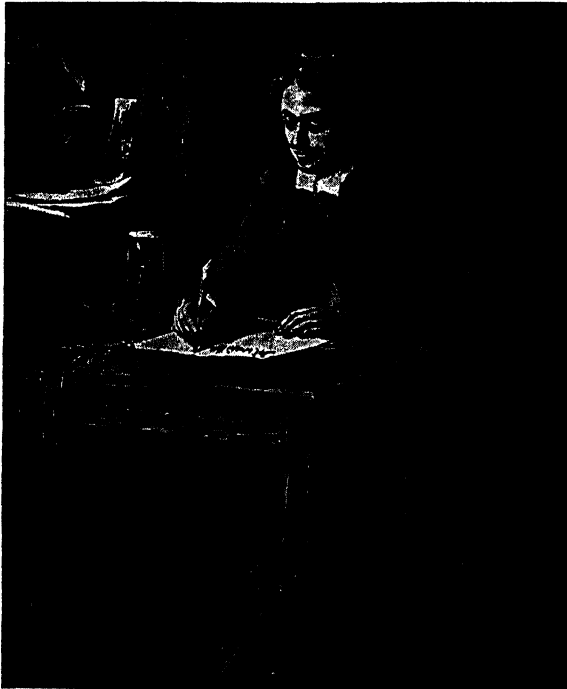
It was in the year 1702 that he made his memorable appearance in the pillory, and two years later we find him a prisoner in Newgate Prison, where he had been lodged by his political oppo-

nents, who were then in power. Being a man of boundless energy, he did not sit idly in prison. He seems to have been allowed a certain amount of liberty, for during his stay in Newgate he actually began to publish a weekly paper, in which, in the most fearless manner, he continued to attack the policy of the Government of the time, and to support the Protestant cause in the face of all its enemies.

For about thirty years before his death, which occurred on April 24, 1731, in the seventieth year of his age, his pen was never idle in writing of some kind. Even if all his histories and

essays and satires were to be forgotten—as, indeed, most of them are likely to be some day—the name of Daniel Defoe would never grow dim, for the popularity of "Robinson Crusoe," is bound to keep it bright for ever. He was the first great story-teller who made use of the natural form known as the novel, now so popular, and when he died, in 1731, he was buried in Bunhill Fields, where, forty-three years before, John Bunyan had been laid to rest.

BUNYAN WRITING HIS STORY IN PRISON



John Bunyan was a preacher in the time of Charles II., when all religious teachers who did not belong to the State Church were subject to cruel persecution. Bunyan suffered twelve years imprisonment for daring to preach the Gospel, and later, when imprisoned for six months in the town gaol at Bedford, he wrote the first part of his most famous book, "The Pilgrim's Progress."

the boys and girls who had enjoyed reading "Robinson Crusoe" were only too delighted to take part in this humble service to the memory of its immortal author.

Although all boys and girls love Daniel Defoe's famous story, it is doubtful whether they would have loved the man himself. He was so keen a fighter with his pen, and so devoted to his literary work, that he probably had very little time to make himself agreeable to his friends, and especially to the little ones. But we are certain that few boys and girls could have loved Jonathan Swift,

In the course of time the old tombstone over Defoe's grave became broken, and the lettering obliterated. It was a happy thought when, not so many years ago, a London newspaper appealed to the boys and girls of England to subscribe for a new monument to the memory of the writer of the most delightful of all the stories a boy or girl may read. As a result of this, a handsome Egyptian pillar

was erected in place of the broken old tombstone, for the boys and

the next great story-teller to be born in the United Kingdom.

We have already read about Swift's famous book, "Gulliver's Travels," on page 1333. As we there read, he was a great writer of satire. Now, to be satirical one has always to be looking for the faults of others, and that is not the way that leads us to the love of our fellow-men. Swift spoke very bitterly of most people, and, on the whole, was not a very agreeable companion. But for all that he was a remarkable man, full of imagination, a great writer, and, in short, what we call "a genius."

THE LIFE OF JONATHAN SWIFT, WHO WROTE "GULLIVER'S TRAVELS"

Jonathan Swift was born in the city of Dublin, on November 30, 1667, his parents being of good family, but his father died before Jonathan was born, and his mother was left very poor.

He must have been a winning little boy, this fatherless Jonathan, for his nurse loved him so much that she took him away with her when she went to live at Whitehaven, and kept him for three years. So well had she looked after him and guided his infant mind that when he was again restored to his mother he was quite the cleverest little boy one could imagine. Before he was five years old, we are told, he was able to read any chapter in the Bible.

As Jonathan's mother had relatives of rank and wealth, he was not without help when he needed it, and the lad was sent to Dublin University at fourteen years of age and later to Oxford. There is nothing that one can say in favor of his university days. He seems to have been, on the whole, a very bad student.

When he was twenty-seven years of age he became a clergyman in Ireland, and except for some four years he continued to discharge the duties of a clergyman to the end of his life.

THE CLOUDED LIFE OF THE MAN WHO MADE THE WHOLE WORLD LAUGH

It was in April, 1713, that Swift was appointed Dean of St. Patrick's, Dublin, and thirteen years later he wrote "Gulliver's Travels." More than twenty years before that he had written two famous books—"The Tale of a Tub" and "The Battle of the Books."

The romance of his life was connected with a lady called "Stella," whom he

had known as a very young girl. Meeting her later when she had grown into a graceful young woman, he fell in love with her. He wrote many letters to her, and one of the books by which he ranks high as an author is his "Journal to Stella," in which his genuine love for the lady is most charmingly displayed.

Many other books he wrote besides those familiar to us—histories, political studies, poems. But while we cannot help admiring the great cleverness of the man, or enjoying to the full the playfulness of his genius in such a work as "Gulliver's Travels," we do not feel him to be so warm a human being as good John Bunyan. It is sad to think that his later years were clouded with the fear of madness; that, ten years after he had displayed so much mirth and playfulness in the story of Gulliver, he began to be so gloomy in his own mind that for the nine remaining years of his life he was often a stranger to happiness. He died in 1745, and was buried in the Cathedral of St. Patrick's, Dublin.

SAMUEL RICHARDSON, THE LITTLE PRINTER WHO WROTE SOME FAMOUS STORIES

A quaint little figure was that of the next great story-teller in those early days to which we have here turned back. He, too, was the son of very humble parents, his father being an ordinary carpenter in Derbyshire, where, in the year 1689, Samuel Richardson was born.

Boys and girls need not be expected to read any of his stories until they have grown up, and even then there is no particular reason why they should read them at all. Still, Richardson bears one of the greatest names in the history of English literature.

Richardson's stories were chiefly written in the form of long-winded letters supposed to be addressed by one character to another. Nowadays our lives are much too varied and active to leave time for reading such very long and unexciting stories as he wrote, but our great-great-grandfathers had more leisure and fewer interesting books, so that they could find time to follow the slow and steady unfolding of his appallingly lengthy tales. Indeed, we may guess how interested they could be in his stories when we are told that in country villages people used to wait anxiously for the arrival of the next part of his novels to find out what was to happen

THE AUTHOR OF "ROBINSON CRUSOE" IN THE PILLORY



Daniel Defoe, who wrote "Robinson Crusoe," was a strong Protestant, and a fearless advocate of the government of the country in the interests of the common people. He wrote many pamphlets attacking the Government of his day, and for doing so he had to suffer imprisonment. On one occasion he was made to stand in the public pillory, but the citizens of London admired him so much that when he was in the pillory they brought offerings of flowers to him, and had to be kept away by soldiers, as we see in the above picture.

to the characters, and when the heroine of his dreary story, "Pamela," was made to marry the rather unmanly hero, church bells were rung in some villages as though Pamela had been a real person!

This is all very strange to us now, for neither that story nor "Clarissa," which he took eight years to write, nor "Sir Charles Grandison," has the slightest attractions for people of our time. These famous books are only interesting as showing how the taste of one generation differs from that of another.

Samuel Richardson had very little education, and at the age of seventeen he was apprenticed to a London printer, who made him work so hard that he had no leisure for reading or study. But he was as industrious as he was honest, and he made up for the time of which his master robbed him by sitting up at night, when he ought to have been asleep, to read any books he could secure. The candles used for these midnight studies he bought himself, so that his master

might not have to pay for the convenience of his apprentice.

An unambitious, steady, plodding, honest and industrious, and perhaps a very commonplace young man, was this Samuel, but after fifteen years he had some reward from the printer, as he married his master's daughter, having now become a printer on his own account in a court off Fleet Street, close by the old church of St. Bride. Here he continued for many years to carry on his business like any other printer of his time, living above his workshop, and thus spending most of his time amid the smell of printers' ink. We can well believe that he was a kind and considerate master, and it is said he used to hide a silver coin among the types at night so that the first man to arrive at the workshop in the morning might have it as a reward!

Richardson was not far short of fifty years old when he determined to make himself famous by writing a novel, and

"Pamela" was the result of the little printer's resolution. He certainly succeeded in making himself famous, and, being perhaps somewhat vain of his literary powers—which at the early age of thirteen he had first exercised by writing love-letters for some ignorant servant girls—the remainder of his days were spent with much satisfaction in writing for the sentimental ladies of his time, to whom the languishing and tearful heroines of his novels seem to have been strangely attractive.

THE END OF ONE GREAT STORY-TELLER AND THE BEGINNING OF ANOTHER

The little printer of Salisbury Square, though so few of us read his writings to-day, certainly gave a great impetus to the art of fiction in England, and the careful and elaborate way in which he traced the natures of imaginary people was also imitated by writers on the Continent, and chiefly in France, where to this day the works of Richardson are in high repute. He died on July 4, 1761, and by his own request was buried in the church of St. Bride, near to which so much of his life had been passed.

When an author invents some unusual way of telling a story, it frequently happens that another author will turn it into ridicule by writing what is called a parody of it. So it happened with Richardson's "Pamela," which an abler and far more gifted man than he, two years after its appearance, took as the idea of a very different sort of story, called "Joseph Andrews."

The writer of this was a born story-teller, a man of great force of character, the son of distinguished parents, and well educated. His name was Henry Fielding, and he was born in Somersetshire on April 22, 1707.

HOW HENRY FIELDING WAS FORCED TO WRITE STORIES FOR A LIVING

Being fond of the pleasures of life, and disinclined to work or to study too closely, Fielding left the University of Leyden, in Holland, and returned to London when he was twenty. But he soon found that his father was not able to allow him so much money as he had expected, and he had to exercise his abilities by writing for the stage.

After a while he married a beautiful lady who had a small fortune; but this he soon contrived to spend, and at thirty-

three he became a barrister, though it was chiefly by writing books that he made his living. His wife died in 1743, and he then married a servant, who made him a very good wife to the end of his days. Poor man, he was not long to enjoy the success of the great books he wrote, nor the advantage of the comfortable salary he received from a legal appointment given to him in 1749.

It was in that year that he wrote a very brilliant satire called "Mr. Jonathan Wild the Great," and in the same year appeared his most celebrated novel, "The History of Tom Jones," which is one of the great masterpieces of English fiction. His third and last novel was "Amelia," which appeared in 1751. All his stories are written with a fine vigorous feeling of life, and overflow with humor, a quality in which Richardson was utterly deficient.

In 1754, while on a visit to Lisbon, where he had gone broken in health, he died, and there in the cemetery of the British Factory—for in those days there were many such trading posts under the flag in foreign countries—one of the greatest of English story-tellers and earliest of her novelists was laid to rest.

LAURENCE STERNE AND TOBIAS SMOLLETT AND THE BOOKS THEY WROTE

Laurence Sterne, like Jonathan Swift, whom he resembled to some extent in character, was born in Ireland, though his ancestors were English people of good position in Church and State. He was born on November 24, 1713, and educated at Halifax Grammar School and Cambridge University, becoming a clergyman in the year 1738. For a good many years his life was, no doubt, that of an ordinary English country vicar, except that, being at once satirical and bitingly sarcastic in his speech, thin in appearance and poor in health, he was probably by no means so pleasant a companion as a country vicar ought to be.

When he was forty-six years of age he published at York the first two volumes of his great and amusing book, "The Life and Opinions of Tristram Shandy." Very soon the wit and humor with which the characters in this great work were drawn had made the name of Sterne famous, and for years new volumes of the work continued to appear, until it was completed in the year 1767, just

about two months before its author breathed his last.

On the whole, Sterne was not a pleasant kind of man to contemplate, and although his books are full of high spirits and laughter, it is not always the healthiest laughter, nor are his sentiments such as do credit to a preacher of the Gospel, who during his later years may be said to have written under the shadow of death. His other famous book is called "The Sentimental Journey

money, he went to sea as assistant to a naval surgeon.

After his return to London, he practised as a surgeon, and as he married a lady who had some wealth he wrote for a time more for pleasure than profit. Later, he adopted writing as a profession. He became a journalist, wrote histories and books of travel, translated foreign stories and edited papers. But, above all, he produced three novels very similar in character to those of Henry Fielding,

OLIVER GOLDSMITH AND THE FAMOUS STORY THAT PAID HIS DEBTS



Oliver Goldsmith was so improvident that he was always in difficulties. Once his landlady had him arrested for debt, and when his friend, the great Dr. Johnson, found him a prisoner in his lodgings, Goldsmith showed him the manuscript of a story he had written, and Johnson was immediately charmed with it. He took it out and managed to sell it at once to a bookseller for \$300, which enabled Goldsmith to pay his landlady and get rid of the bailiffs. The manuscript was the famous story known as "The Vicar of Wakefield."

through France and Italy." It is very witty.

Tobias Smollett was a Scotsman, born near the "Bonnie, bonnie banks of Loch Lomond" in March, 1721. He went to school at Dumbarton, and to Glasgow University, and when he was about fifteen was apprenticed to a surgeon in Glasgow. He wished, however, to be a writer, and at the age of eighteen went to London with a play, which he had written, in his pocket. But no one would buy the play, and as he had no

and nearly always mentioned in company with them as the best examples of English novels written before the time of Sir Walter Scott. They are full of interesting and life-like characters, and his sailors especially are the breeziest, saltiest sons of the sea to be found in English story-books. The names of his three famous books are "Roderick Random," "Peregrine Pickle," and "Humphrey Clinker," the first being written in 1748, and the last, which is also the best, in 1771, in the September of which year

Smollett died at Leghorn, in Italy, where he was buried in the English cemetery.

Oliver Goldsmith, like two of the other writers we have heard about, was also born in Ireland, but he came of Irish ancestors. His birth took place on September 10, 1728, and he was in his twenty-first year when he managed, without any great credit to himself, to take the degree of Bachelor of Arts at Dublin University.

HOW GOLDSMITH WANDERED THROUGH EUROPE PLAYING ON HIS FLUTE

In Oliver it is to be feared we have by no means a type of character that can be greatly admired, for he was always doing the wrong thing, and disappointing all his best friends. Fortunately, perhaps, his effort to become a clergyman was unsuccessful, and his determination to come to America brought him no farther than Cork; while some money he got to enable him to study law in London he lost by gambling at Dublin. When he was twenty-four he went to Edinburgh to study medicine, and although everybody liked him, he did nothing of note at the college.

Next he went to the famous University of Leyden, where Fielding had been before him, and there again he lost what little money he had by gambling. In those days it was the custom of English gentlemen to make a tour of the chief towns of the Continent, and this Goldsmith attempted to do on foot and penniless, playing on his flute by the wayside and in the villages to earn a few cents. Surely the "grand tour" had never been so meanly performed.

THE AUTHOR OF "THE VICAR OF WAKEFIELD" IN HIS DAYS OF POVERTY

In 1756 he struggled back to London, the owner of a few cents, a ragged suit of clothes, and a dirty wig. He tried unsuccessfully to make a living as a physician, was at one time a reader of proofs for Samuel Richardson, and also acted as usher in a Peckham school. Then he became what is known as a hack-writer, or a poor scribbler at low pay for any sort of publication that would employ him. In short, he seemed to be one of life's failures; but a book which he wrote about the education of his time attracted some notice, and when he was thirty-one years of age he was employed by Smollett on a paper

which that busy writer was editing; while other editors gave him opportunities of doing better work.

Goldsmith was now a busy author, and if he had had as much common-sense as he had genius he might have lived in luxury; but it was not to be, though he had many warm friends. For he was himself a lovable and gentle creature, despite his ugly face, pitted with small-pox, his short and ungainly figure, and his stupidities of speech. His great friend, the famous Dr. Samuel Johnson, said of him that "No man was more foolish when he had not a pen in his hand, or more wise when he had"; while Garrick, the great actor of the day, made a couplet about him:

Here lies poet Goldsmith, for shortness
called Noll,
Who wrote like an angel, but talked like
poor Poll.

No other author whose unhappy lot it was to write so much to the order of publishers has written so well in so many different ways. His famous comedy, "She Stoops to Conquer," is a perfect stage play; "The Deserted Village" gives him no mean place as a poet; and "The Vicar of Wakefield," his only work of fiction, is one of the most beautiful stories in our language.

HOW THE SALE OF A STORY SAVED GOLDSMITH FROM AN ANGRY LANDLADY

Yet so stupid was the writer of this lovely story that it is said his friend Dr. Samuel Johnson on one occasion found poor Goldsmith arrested by his landlady for debt, and in his desk lay the manuscript of this immortal story, which the kindly doctor took out and sold to a bookseller for three hundred dollars, enabling the impractical author to pay off his debts to his landlady—and to begin incurring new ones; for when he died in his lodgings at Brick Court, in the Temple, London, on April 4, 1774, he was ten thousand dollars in debt.

His story is indeed a sad one, as his life might have been one of complete happiness, for he was gifted beyond most men of his time. But we shall find as we read the stories of great men of genius, whose writings are among our greatest treasures, that they have not always been able to order their own lives wisely and well.

THE NEXT STORIES OF MEN AND WOMEN ARE ON PAGE 1857.

THE WONDERFUL COLORS OF BIRDS



Woodpecker
9 inches long



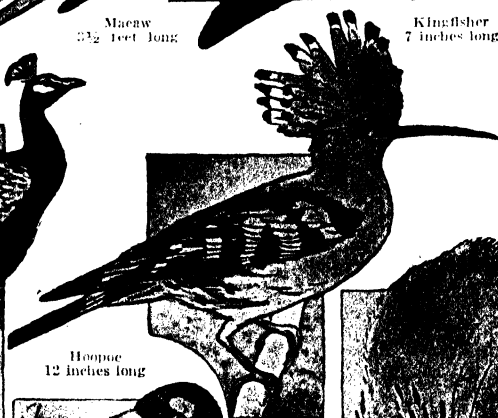
Macaw
33½ feet long



Humming-bird
5 inches long



Peacock
7 feet long



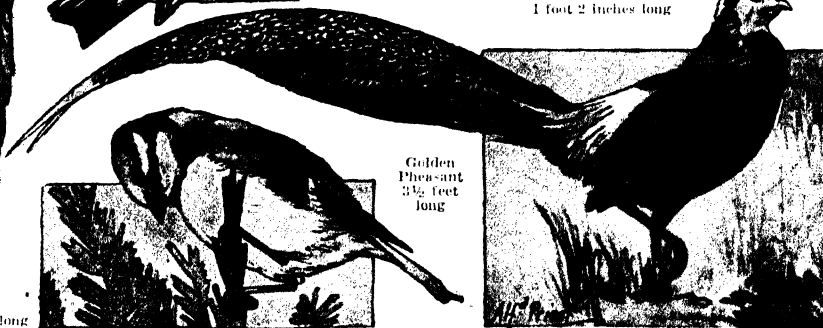
Hoopoe
12 inches long



Goldfinch
5 inches long



Bird of Paradise
1 foot 2 inches long



Golden
Pheasant
3½ feet long

Blue Tit
4½ inches long

Nature showered beauty upon the humbler creation as well as upon human beings. Some of the birds are as gorgeous as the rainbow, and make wild scenes and commonplace areas radiant with their glory. Some of the finest of the birds are shown here, and the figures under each name tell us their actual sizes, the length given being in each case the length of the bird measured from point of beak to tip of tail.

The Book of NATURE



The Home of the Weaver-birds

THE BIRDS OF BEAUTY

WHEN Alice was in Wonderland, if she wanted suddenly to grow tall or to make herself smaller, all she had to do was to eat a piece of cake or mushroom, or drink something from a bottle, and she at once became the right size. When we think of birds becoming brilliantly colored, or marked like the surroundings in which they live, we think of Alice. But, of course, the case in real life is different from that in the story-book. No bird ever says to itself, "I will make my feathers the color of the rocks and sand in the desert, so that the hawks and eagles shall not see me." Nor does it make up its mind to wear rich and gorgeous plumage. The appearance of birds is brought about by long ages of change, by the slow working of natural laws.

Suppose we have a number of birds living in a place where they have many strong enemies. They cannot escape by fighting, for they are not strong enough. They cannot escape by flying, for their enemies fly faster. The probability is that they will be killed. But if some of the birds have feathers which enable them to appear, when hiding, like the rocks or sand, or like the trees or jungle, it is very likely that those birds will escape.

The birds which have not this advantage will be caught and killed, but the others will live, and the baby birds hatched from their eggs will be like them. It will become part of

CONTINUED FROM 1646



their nature to seek safety by hiding. Gradually they will become more and more like the scene in which they live. If the change of seasons brings great changes in the character of the foliage, the birds will be able to change their feathers so that they will keep pace, in appearance, with the altered looks of the things about their homes.

That is one way in which Nature enables birds to flourish. But there is another way. It is the way of the female bird to mate herself to the handsomest among her suitors, like the princesses in the story-books; so that each generation of birds in this way tends to become stronger and more handsome. But the hens of gorgeous bird families are, as a rule, neither gay nor splendid, so that they may sit on the nest and hatch the eggs without danger of being molested by their enemies.

The most gorgeous birds in the world are the birds of paradise and the humming-birds. The first of these is, like the bower-birds, a distant cousin of our old friend the crow. Only a naturalist could discover this. To anyone not acquainted with the science of natural history, it would be hard to imagine a greater contrast than that between the crow and the bird of paradise. But then the bird of paradise does not differ more from the crow than one species of bird of paradise differs from another

species. There are nearly fifty different species of birds of paradise, and many of them may claim to be among the fairest of Nature's children. Not only are they beautiful in coloring, but the arrangement of the feathers of some of them is really extraordinary.

THE GORGEOUS PLUMAGE OF THE BIRDS OF PARADISE

There is one called the twelve-wired bird of paradise. Its tail is short and square, but there grow out twelve long, wire-like feathers, or bristles, for they are only the bare stems of feathers, which curve round towards the sides of the wings, and give the strangest appearance to the bird. The chief colors in its magnificent plumage are purple-bronze on the head, green and purple and black on the neck, bronze green on the back and shoulders, and emerald green to the edges of the outer wing feathers, with brilliant violet-purple to the rest of the wings and tail, and rich yellow on the breast. This bird is, including its two-inch beak, a foot in length. The long beak supplies the bird with food, which it takes in the form of honey from flowers.

There is a larger bird of paradise than this—the long-tailed one of the mountainous regions of New Guinea, which is over a yard in length. It is colored as richly as the other, but it adds a fan-like arrangement of feathers which rise from the sides of the breast, expanding at their outer ends in brilliant blue and green, while the tail feathers are of a lovely opal blue. Underneath the bird is white, and when it raises the long feathers on its sides and breast into two half-circles, it forms as extraordinary and beautiful a sight as one could see.

THE KING OF THE GAY BIRDS AND ITS WONDERFUL SPRAY OF FEATHERS

The gorget bird of paradise lives in the same region, and is distinguished by a long tail and a velvety arrangement of plumes round the head and throat, of copper color and golden green.

The king of the gay birds is, however, the great paradise bird—a bird half the size of the long-tailed one, but lovely beyond description. The chief color of the body and wings is deep, rich brown, varied by tints of black and purple and violet. The top of the head and neck are colored like yellow plush, while

from beneath the eyes and round the lower part of the throat run feathers of emerald green, from which spring deeper green feathers in a band across the forehead and chin. The beak is blue, and the feet are pink.

The most wonderful feature of this wonderful bird is a superb spray of feathers which it erects to cover itself and look its best. These feathers grow out from under each wing, rise into the air, and curve gracefully over in descending plumes, as much as two feet in length. The plumes are of a deep orange color, pale brown at the tip, and they cover the bird as with a cascade of glossy feathers.

When the male birds set out to win mates they gather together in the trees which they haunt, and dance and spread their feathers in the vainest way. On one of these trees, says Dr. Russel Wallace, who studied them in their native home, a dozen or twenty magnificent male birds in full plumage may be seen together. They raise their wings, stretch out their necks, elevate their lovely plumes, and keep them continually vibrating, so that the whole tree is filled with waving plumes in every variety of attitude and motion.

THE BIRD WITH PLUMES LIKE FANS AND A TAIL LIKE A RACKET

We have been speaking of this one as the king of the birds of paradise, but the one that the naturalists call the king of paradise birds is only about six inches in length, and is distinguished by two fan-like plumes on the breast, and a tail of curved feathers shaped at the end like a racket. Its feathers are green, purple, red and white.

Wilson's bird of paradise, another member of this family, named after its discoverer, is almost bare upon the head, over which two narrow tracts of feathers form a cross. The rest of the head is bare, and the skin a deep blue. From its tail grow out two long feathers, which cross, then curve completely, looking like the handles of a pair of scissors.

As we have a twelve-wired bird of paradise so we have also a six-plumed one. The plumes are long, glistening, wire-like growths, springing from the back of the head, and bare all the way up to the tips, where dainty webs of feather appear. This bird has a gorgeous

THE BIRDS OF BEAUTY

ruffle, and a tuft of silver feathers upon the beak, which it can cause to lie flat or stand up at will. No pen could describe the glories of these birds. They must be seen. When a zoo is fortunate, it has one or two alive, but they are hard to keep in captivity. We can give them the proper sort of food, for

America, and certain mountain slopes. For beauty of plumage there is no bird to surpass them. They are as gorgeous as the birds of paradise, but not with the same stately grandeur, for the biggest of them are small, and the tiniest only two and a half inches from beak to tail. Yet they are most wonderful flying birds.



"A MEETING OF PARROTS," PAINTED BY STACY MARKS, R.A.

they like fruit and insects and seeds, but we cannot give them their native air and freedom.

We have seen in earlier stories how birds and animals develop in a special way in particular parts of the world. The wonderful little humming-birds inhabit the warmer parts of North and South

The conjurers rightly say that the quickness of the hand deceives the eye. Well, the humming-bird's quickness simply makes it impossible for the human eye to follow it. It is like the flash of shooting stars. A famous man who has often been near these birds in their native forests has told us how

very difficult it is to see them. While he was watching a flower he suddenly saw something come between his eye and the bloom. It was a humming-bird, but it seemed like a grey blur as it paused for an instant before the flower. There was a look as of four black threads suspending it in the air. This would be the moving forks of the bird's tail. There was a grey film as, like lightning, the bird vibrated its wings; then, with a sharp twitter, it turned. There was a flash of emerald and sapphire light as the sun was reflected by its plumage, and in an instant it had vanished. It all happened so quickly that the word remained unspoken on the watcher's lips, the thought in his mind had scarcely had time to change. Yet in that time the bird had flown to the flower; it had thrust in its beak, shot out its long tongue, and sucked up the honey and insects in the flower; and it had gone to a new flower which would furnish the next portion of its meal.

HOW THE HUMMING-BIRD HANGS IN THE AIR SIPPING HONEY FROM A FLOWER

Everybody who has seen the humming-bird in its native wilds gives us the same impression of its marvelous swiftness. No one can see its wings move—they are vibrated too quickly. And it is because of the rate at which they move that the bird makes the humming sound which gives it its name. It lives all day in the air. It is never tired of flying, unless it be one of the few species which are more like other birds, and prefer, through weakness of wings, to take its food while perching. Most of the humming-birds feed when flying. This is, of course, the habit of other birds—of the swallow and goat-sucker, for example—but the humming-bird has to hang in the air while sipping the honey from a flower. To do this it possesses wonderful wings for its size.

Birds are supposed to be unable to fly backwards, but the humming-bird is an exception. It can fly backwards for a little way. When it approaches a flower it inserts its long beak, while its body is raised higher than the flower. As it puts in its beak it lets its body sink down in the air, as if it were holding on to the flower by its beak. But it does not; its splendid little wings are working like steam-engines to keep it afloat in the air. When it has sipped

such honey as the flower contains it raises its body again, withdraws its beak, and then flies out backwards, and darts away like a flash.

Some of the humming-birds can turn right round in the air with a single motion; some seem to dance in the air, while they can all dart from side to side in a manner such as to make the swallow, which they most resemble, seem slow and commonplace.

THE FIVE HUNDRED KINDS OF HUMMING-BIRDS & THEIR REMARKABLE POWERS

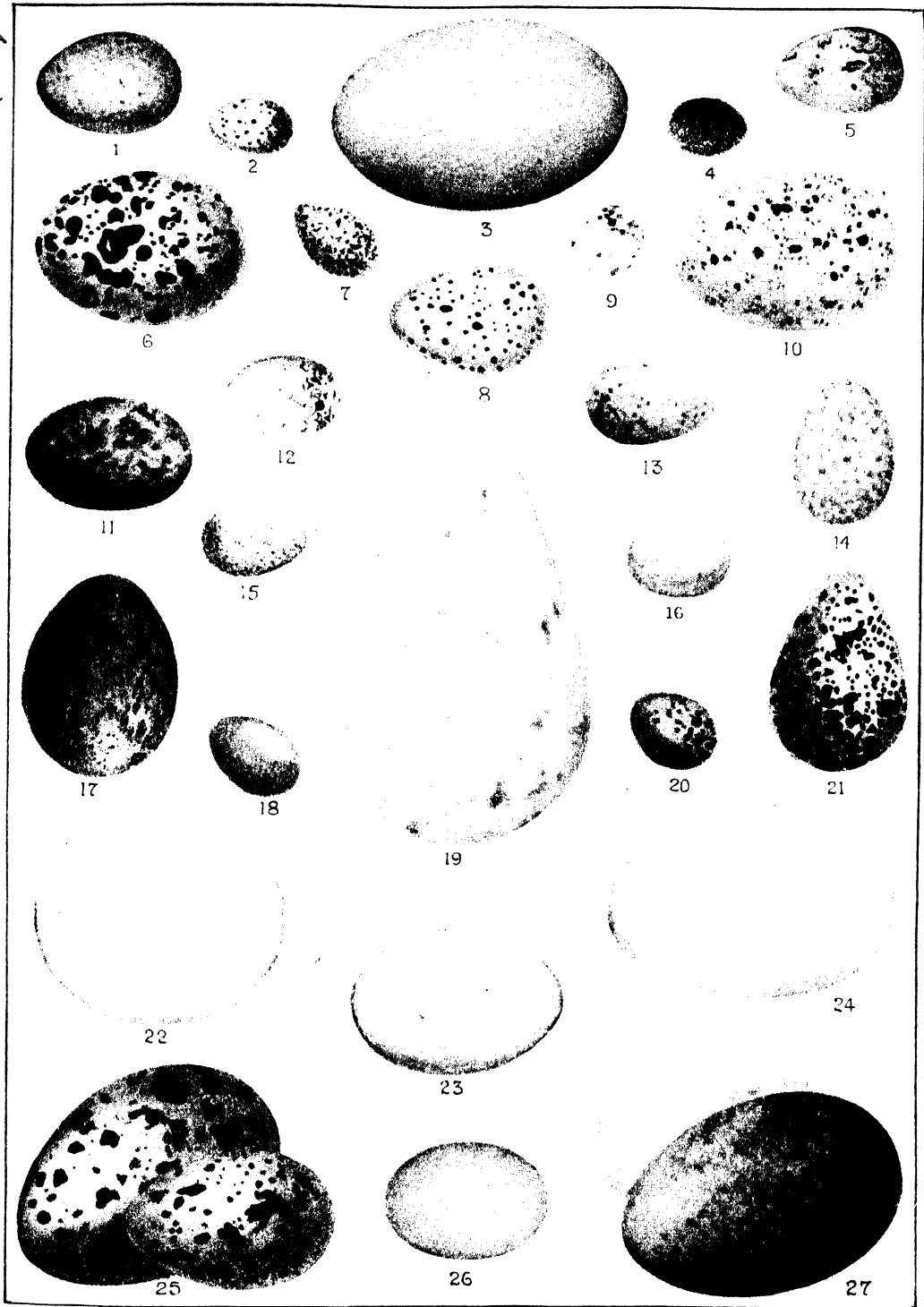
When young, the humming-bird might pass for a strange sort of swallow, for its beak is blunt and wide like that of the young swallow. But as it grows older the beak gets longer and slenderer, until the full-grown bird has a bill ready to dip into the smallest flower to drink the honey which it stores. It does not depend wholly upon honey, though that is the chief part of its food. It eats a great many insects. In this respect it is a good friend to man. But it has another value: by going from flower to flower as it does it carries pollen from one to another, and does for those flowers what bees do for others, in making the plant fruitful.

There are nearly five hundred species of humming-birds, so it is hopeless for us to attempt any detailed description. The most remarkable part of their frame, after their splendid wings, is the long beak with its tongue capable of being shot out like that of the chameleon. The tongue acts like a pump, and the beak is wonderfully constructed to help.

THE HUMMING HERMIT-BIRD OF THE FOREST, & A GIANT EIGHT INCHES LONG

Among the most famous humming-birds is the Jamaican, which has two long feathers growing beyond its tail, far longer than the body of the bird. The hermit, with its long beak and long tail, haunts the dark forest, eating insects, instead of seeking honey in the sunshine. The sword-bill is the longest-beaked of all the humming-birds. Although the bird itself measures only four inches, the male bird has a beak four inches in length, while the female, still better provided, has a bill nearly twice the length of her body. The giant humming-bird is eight or more inches in length, and has wings measur-

CHARACTERISTIC EGGS OF AMERICAN BIRDS



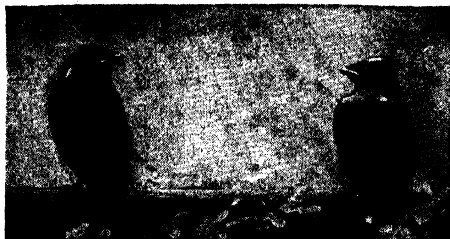
1. Jays
2. Titmouses
3. Egrets and Herons
4. Wrens
5. Orioles and Blackbirds
6. Geese or Partridges
7. Swallows

8. Woodcock
9. Pewee Flycatchers
10. Gallinules, Coots and Mudhens
11. Whip-poor-will; Night-hawks
12. Towhee finch
13. Vireos
14. Brown Thrasher

15. Cowbird
16. Larkbird
17. Crows, Ravens, etc.
18. Thrush
19. Guillemots and Auk
20. Sparrows
21. Plovers

22. Owls
23. Grebes
24. Stump-duck
25. Gulls and Terns
26. Cuckoos
27. Hawks and Falcons

STRANGE BIRDS WITH STRANGE FEATHERS



The waxwing has many of its feathers tipped with red like sealing-wax. Like many birds, the waxwing does not get its fine feathers till full grown.



The tropical manakin is brilliantly colored with a feather beard. It has a curious flight, and the beating of its wings sounds like a spinning-wheel.



This bell-bird has a wonderful note, like a silver bell. When many are calling, the sound of note following note is like the beating of many hammers on anvils.



The nightjar flies in the dark, swiftly and silently as a swallow. It is wrongly called the goat-sucker.



The cock-of-the-rock is also a chatterer, brilliant orange-red in color, and crested to the tip of the beak.

The photographs on these pages are by Lewis Medland, W. P. Dando, Oliver Pike R. B. Lodge, and others.

The quetzal is a Central American trogon. Its feathers keep their lovely colors even after the bird's death.



The umbrella-bird is the biggest of the chatterers, famous for its umbrella-like hood of gay feathers.

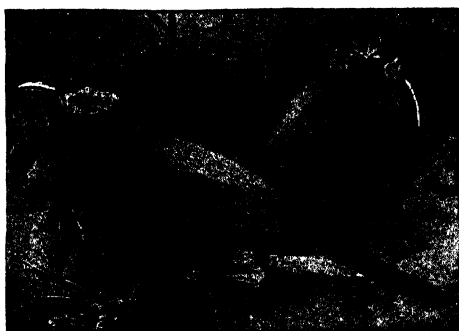


The banded cotinga is a Brazilian bird which lives among the tree-tops, only descending to feed.

THE HANDSOMEST BIRDS IN THE WORLD



The satin bower-bird, a member of the crow family, is a great gardener and builder, and loves to make his home beautiful with flowers and gay feathers.



Java sparrows are often seen in our aviaries. They have smart white feather collars in winter and spring. The Java sparrow is a type of the weaver-bird.



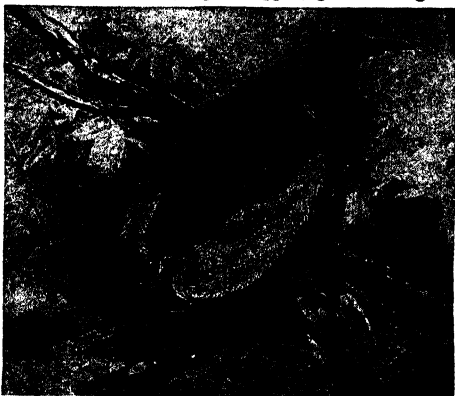
The gorget bird of paradise is most beautiful with its colors of black, purple, copper, green and gold.



The great bird of paradise is the biggest of its family, and has feathers like velvet as well as the wonderful spreading tail. The colors in its plumage are gorgeous.



The humming-bird, one of the loveliest of birds, flies so rapidly that its wings hum like those of a bee.



The twelve-wired bird of paradise has a tail unlike any other bird's. The shafts are bare like wires.

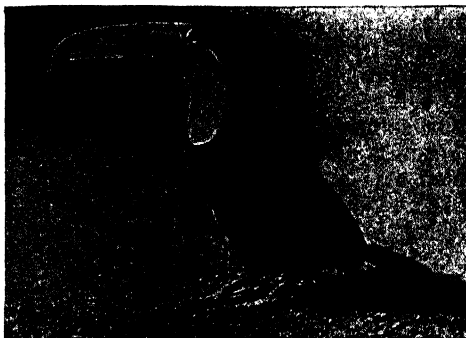


Hundreds of sociable weaver-birds build nests under one roof until the tree breaks under the weight.

SOME BEAUTY BIRDS OF OTHER LANDS



Hornbills live in Africa and India. Kaffirs in time of drought kill a hornbill as an offering for rain.



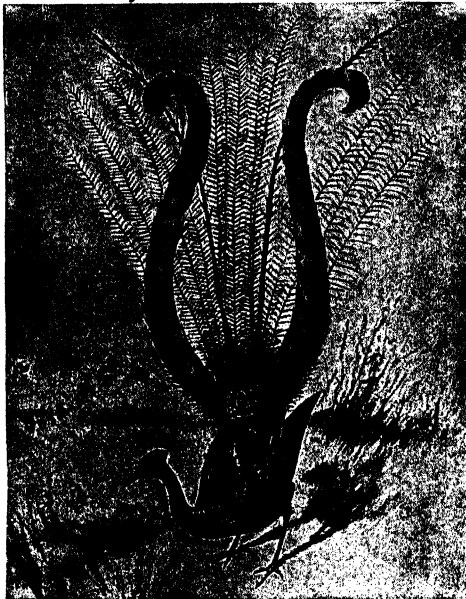
The toucan, which we see here, has an enormous bill, which is honeycombed with air-cells to lighten it.



The laughing jackass of Australia is, as we see here, really a kingfisher. It loves to mimic the human voice. It lives on fish or insects and reptiles.



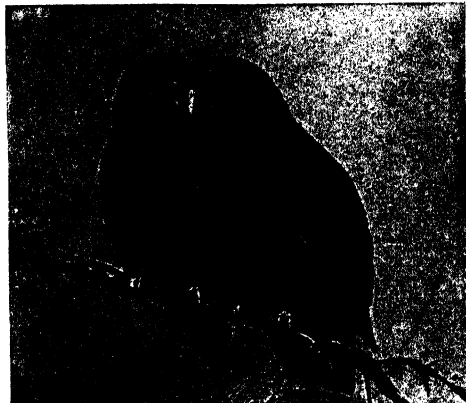
The kaka parrot is a member of the kea family, but harmless. The kea proper kills sheep for food.



Australia's beautiful lyre-bird is closely related to the pretty little wren, though it looks so different.



The grey parrot of West Africa is a clever mimic. It can imitate birds and beasts, whistle a song, mock street criers, and copy the sound of machinery.



Love-birds belong to the parrot family, and though their home is in Africa, they thrive in our homes, where they make amusing little companions.

ing five or six inches across. It hovers over a flower like the smaller ones, but moves more slowly, and seems to gain support from its tail, which, while the bird is tapping a flower, opens and shuts like a fan.

Of course the beauties of the humming-bird are well known. The racket-tailed has two long feathers from the tail, and two, like those at the back of the six-plumed paradise bird's head, bare but glistening to the tip, where

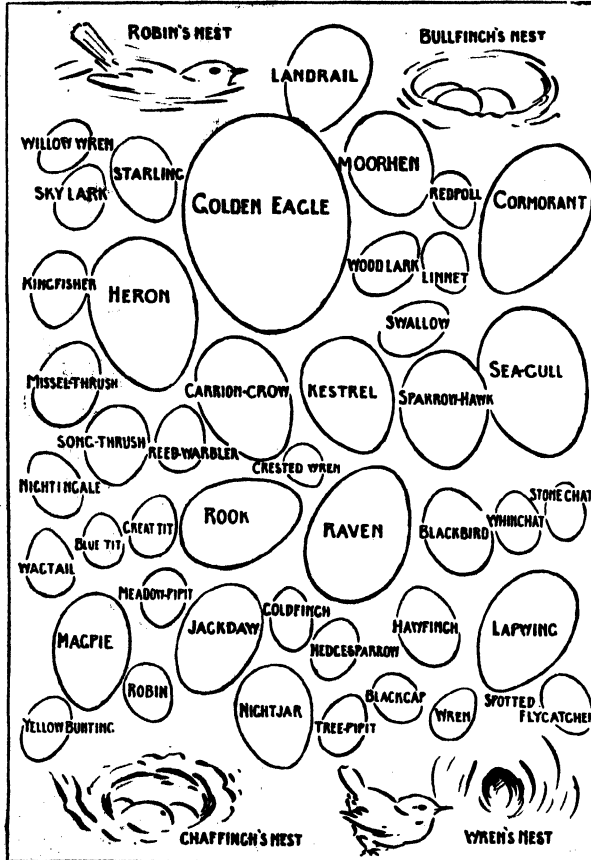
the feather-web grows out in the shape of a racket. Then there are humming-birds with gorgeous crests and ruffs, humming-birds with balls of white feathers round their legs like powder-puffs, humming-birds with "boots" of white feathers, spangled humming-birds, humming-birds with snow-capped heads, with long beaks, with short beaks, with up-curving beaks, and beaks bending downwards like the scimitar of an Indian prince.

We can never say that we have exhausted the beauties of bird-land until we have seen these visions of splendor in their own homes. The sun-birds resemble them and are often called humming-birds, but they belong to a different order.

We must turn back again for a moment to the crow family to make the acquaintance of the bower-birds. The males are a shining blue-black, except on the wings, where they are deep black.

They are handsome, but they interest us chiefly from their love of beauty. They make their nest like ordinary birds, but they build avenues of twigs and houses or bowers to play in. Here the two sexes meet. The male birds show themselves off and the females are wooed and won by the best among them. But while the wooing is in progress the bower is a wonderful place. Sometimes it is several feet high, made of twigs and elaborately decorated.

The gay feathers which other birds have dropped, pieces of colored cloth that they can pick up near men's homes, bleached bones, even bright tools, they take and build into the bower. It is said also that they bite off orchids and other beautiful flowers growing wild near them, and weave them into the decorations. The flowers fade, of course, but the dead ones are taken out each day and thrown behind the bower, while fresh flowers are put in their place. There

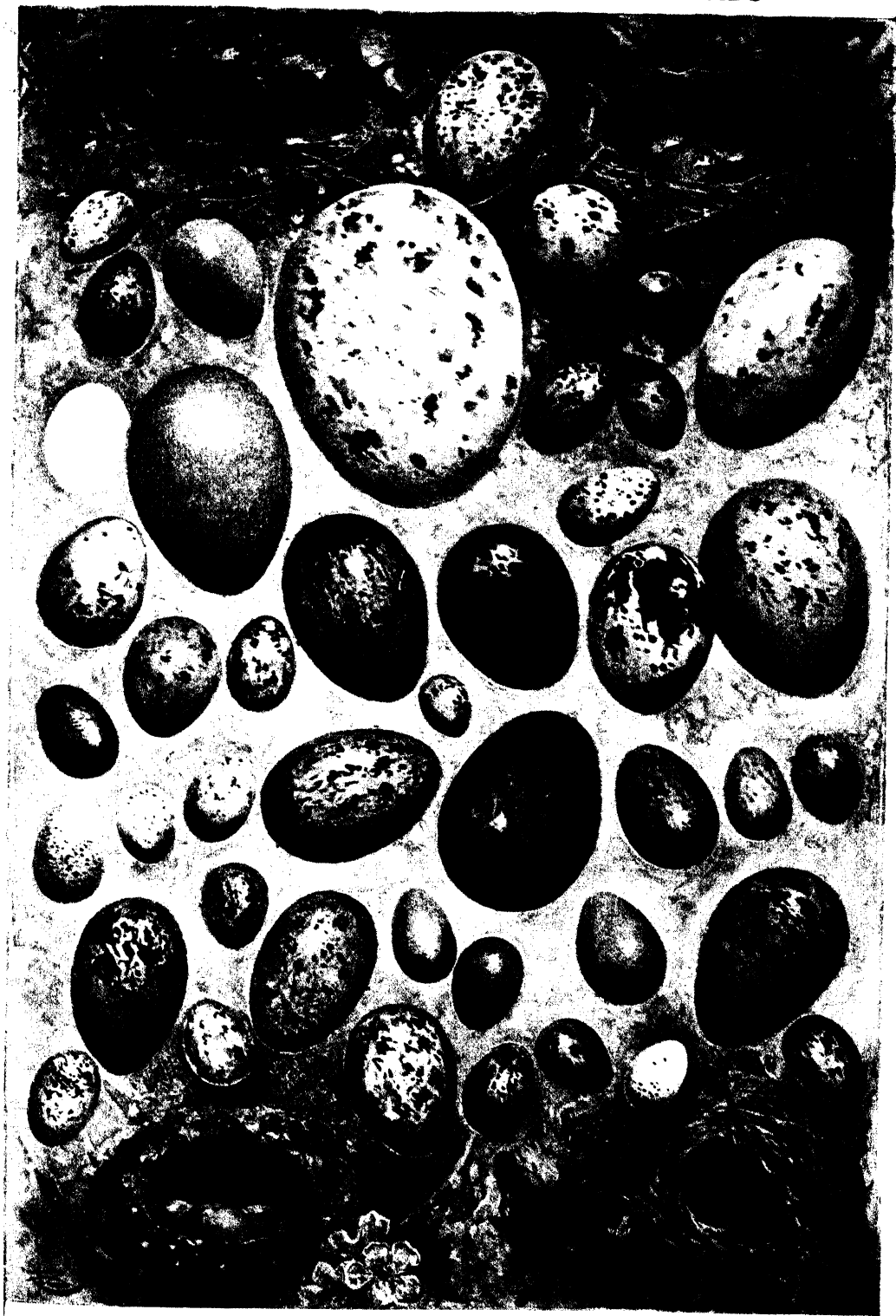


THE NAMES OF THE BIRDS' EGGS ON THE OPPOSITE PAGE

are different sorts of bower-birds, but in all the habit of building bowers is the same. One of them, the Papuan bird, makes a hut, two feet high, at the foot of a tree, roofs it with moss, and builds a gallery round it.

This combining of several birds to build an assembly hall reminds us all of those remarkable birds, the weavers. They form a large family, some of them very beautiful, like the whydah

EGGS OF WELL-KNOWN ENGLISH BIRDS



The names of these eggs are given on another page.

bird. The sociable weavers are even more ingenious builders than the bower-birds. They collect vegetable fibres and weave them round the branch of a tree. This forms the thatch, or roof of the dwelling. Underneath they make a great number of nests, where as many as three hundred birds may have their homes, all under the same roof. There they dwell together in peace, each pair of birds having their own nest and rearing their little ones.

THE WEAVER-BIRDS AND THEIR NESTS, AND THE LITTLE JAVA SPARROWS

In the following year they make new nests. These they join on to the layers of nests made in the previous year. To do so they have to make the roof bigger, and in course of time, as layer after layer of nests is added, the huge structure looks like a thatched cottage. Finally it becomes so heavy that it breaks the bough of the tree upon which it is placed, and a fresh start on another branch or tree has to be made.

The Java sparrow, a favorite bird in our aviaries, which has grey wings, black head and tail, white cheeks and pink beak, is a type of weaver-bird. They are very sociable birds. In the house at which this story is written there is an aviary, where, among the birds, are two Java sparrows and two doves. The Java sparrows have not built nests; they always go to bed with the doves. The doves roost high up on a ledge of cork at the top of the aviary. One Java sparrow, when evening comes on, always perches itself on the shoulders of one of the doves, while its mate takes its place on the ledge of the cork, under the breast and between the legs of the second dove. There is no quarreling about positions unless the doves are late in going to bed. Then the little birds chase their big bed-fellows about, hop on to their shoulders and begin to peck them gently, or pluck at their feathers, as if to say, "Come, come, it's past our bedtime."

THE LYRE-BIRD AND THE PEACOCK, THE BIRDS WITH BEAUTIFUL TAILS

The Java sparrows are not as gorgeous as their distant cousin, the whydah bird, but they are still handsome and very interesting. The white feathers on their cheeks disappear as summer advances, and the cheeks, neck and head are an unbroken black.

We have read already of some of the loveliest birds, like the pheasants. Now we come to another of the big beauties, the lyre-bird. It has a strikingly beautiful tail, shaped like the musical instrument called the lyre. Only the male bird has this, and not until he is four years old. The lyre-bird has a gift for imitating the songs and cries of other birds. In that he has a decided advantage over our most famous tailed domestic bird, the peacock.

Perhaps because it is a comparatively common bird in our zoos and in some parks and private gardens, we do not realize what a supremely beautiful bird the peacock is. No other bird has more perfectly colored plumage, but nevertheless the peacock is a disagreeable bird, with a hoarse screech for its call, which can be heard far and near. In India, of which country it is a native, the cries of these birds, when assembled in hundreds in the woods, become almost intolerable to one who dislikes discordant sounds.

THE STRANGE TOUCAN, AND THE HORNBILL WHICH BRINGS UP ITS YOUNG IN PRISON

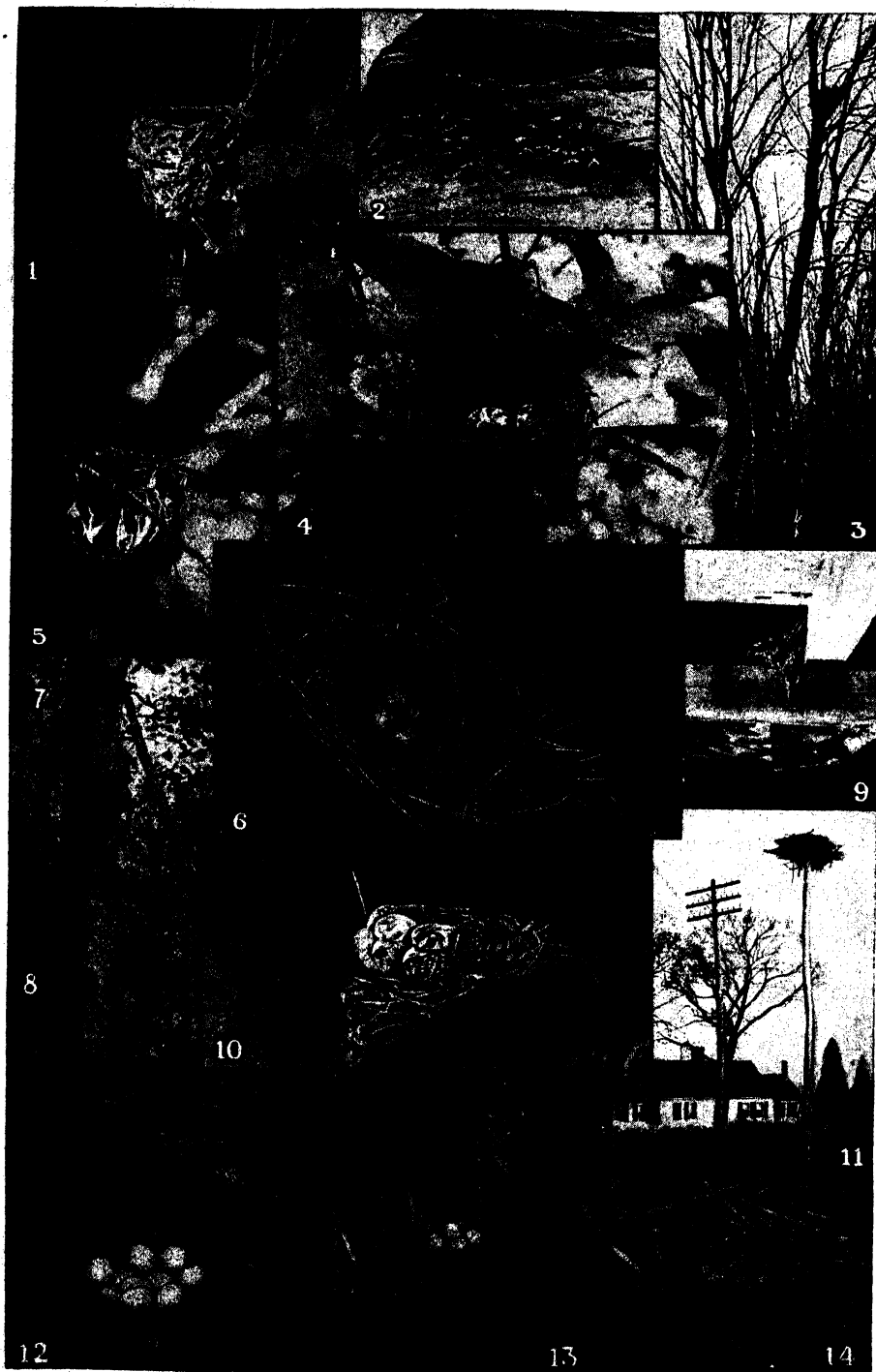
It is well for him that he is such a beauty in appearance, or the peacock would never be tolerated in private life. When the courting season is over, his fine feathers disappear, and he slinks away until new ones grow. Then he comes out again in all his glory, proud as only a peacock knows how to be.

With all their splendor, some of the beauty birds, it must be admitted, are to be regarded as a little freakish, and some of them are not all that could be desired in their ways. Among the strange birds let us take first the handsome but queer toucan and the hornbill.

The toucan is a bird with a huge beak like a small pelican's, but not soft like that great fisherman's bag-net. It is notched like a saw, and as it is brightly colored it gives the bird a very strange appearance. This beak is not heavy, for it contains air-sacs which make it light. The hornbills share this advantage. They have big bills, with helmets of horn on the top, and these are made light in the same way.

The hornbills are famous for a curious fact. When the female has laid her eggs in a hollow tree, the male makes a prisoner of her by plastering up the entrance, leaving only a small slit through which he can pass food for her

CHARACTERISTIC NESTS OF AMERICAN BIRDS



1. Yellow Warbler (type of hempen nest in small tree). 2. Wild Cliff Swallow; Eaves Swallow (nests made of mud). 3. Typical Hawk's, Owl's or Crow's nest (in a forest tree). 4. Redstart's nest (showing a Cowbird's intruded egg). 5. Red-eyed Vireo (hammock-like suspended nest). 6. Nest and eggs of Bluejay. 7. Nest-hole of a Tree Swallow. 8. Nest-hole originally dug by a Woodpecker, now the home of a Wren. 9. Phoebe Flycatcher (on a beam in a stable). 10. Mourning Dove. 11. Fish Hawk; Osprey. 12. Grouse. 13. Grebe. 14. Tern.

and the young ones.' She seems to assist in this. He does not let her and the family come out until the young ones are nearly full grown. The male bird, who has to find the food, is worn almost to a skeleton during this long time.

The king of the handsome climbers is undoubtedly the parrot. We cannot stay here to glance at the whole tribe, for, when we sort out the many forms of parrots, macaws, love-birds, and cockatoos, there are more than 500 species to deal with. The handsome little parakeet which is so often seen in America has its home in Australia. The grey parrot is a native of West Africa. Macaws come mainly from the warm parts of South America and from India. When wild the birds all eat fruit and seeds. One species, however, the kea, has become a flesh-eating bird.

THE STRANGE STORY OF HOW THE KEA BIRD CAME TO EAT SHEEP

This is one of the few instances of a bird's nature changing while actually under the observation of man. Nobody knows for certain what has caused it to change, but the kea has become a deadly enemy of the sheep-farmer in New Zealand. Its food had always been insects and fruit. One day, in 1869, a kea was found standing on the body of a dead sheep, tearing away at the wool. Such a thing had never before been known to happen. Ever since then the kea has been a bird of prey. The change could not have come as suddenly as that; the attacks of the kea must have been made before, but it had never been observed. Now two or three keas attack a sheep together, and by means of their long, cruel beaks they kill it. Then they peck open its body to reach the rich fat inside.

What could have brought about such a change? Some scientists believe that this may be the explanation: There is a curious growth in New Zealand which looks so much like a mass of wool that it is called the vegetable sheep. The kea, by pecking away at this, was able to find grubs and insects which it liked. Then it attacked real sheep in mistake for the vegetable sheep, and pecked away to find its customary food until it reached food which it liked better. Since then it has remained a flesh-eater,

and is the most deadly foe the sheep-farmer has.

THE LAUGHING BIRD THAT MOCKS A MAN IN THE AUSTRALIAN WILDS

While we are thinking of Australasian birds, we must not forget the laughing jackass. This is a bird which could beat the parrot, or even the famous Indian starling—called the myna—at laughing. Parrots and mynas, as we all know, marvelously imitate human speech. Although they are very wise birds they do not understand what they are saying. The mewling of a cat, which they imitate perfectly, has no more meaning for them than a song which they may learn to sing. So the laughter of the laughing jackass has no meaning for the bird. It has a voice, and uses it in this way. It follows a man in the wilds where there are trees, and perches near him, chuckling and laughing all the night and every time he shows himself in the open.

The laughing jackass is really a kingfisher, belonging to a tribe of birds which has many species. They live in nearly every country. Most of them eat fish, which they catch by darting into the water; others live on insects and reptiles, and even rob nests of young.

THE BEAUTIFUL KINGFISHER AND THE BIRD WITH A NOTE LIKE A BELL

The European kingfisher is a beautiful bird, which at one time was very scarce, owing to thoughtless women wearing its plumage in their hats. It flies like a swallow over the water, then, when it sees a fish, dives down like a flash. It can hang in the air like a kestrel, and can drop into the water with the swiftness of a gannet. The belted kingfisher belongs to North America but is rather rare. Some of the kingfishers are said to build their nests of the bones of fish which they have eaten. The nests are built at the end of long tunnels bored by the birds into the steep bank of a stream.

We find more strange beauties among the family of birds called chatterers. The most striking is the umbrella-bird. This has a fine crest upon its head, and though the sides of its neck are naked, it possesses a lovely lappet composed of loose feathers hanging from beneath the throat. When it desires to call its mate,

it raises its crest, moves its lappet in stately fashion, and pipes loudly. A more remarkable piping bird is known as the bell-bird. There are four species of this bird, of which the most famous is a pure glossy white. Its call is like the note, clear and melodious, of a beautiful bell. Sometimes it utters only one note, then rests. At other times it utters several notes, which then sound like a blacksmith playing on his anvil with a hammer. Both these birds are South American, dwelling in the dense, hot forests along the Amazon.

THE STRANGE SONG OF THE MANAKIN AND THE WAYS OF THE HOPOE

In the same family are the manakins, marvelously-colored little birds; and the cotingas, nearly related to the bell-birds, but far more brilliant in plumage. The manakin has a strange little song, which he utters when courting. He dances, too, in the funniest way, as if trying to show how much more agile he is than his fellows. Two rivals meet on the bough of a tree, sing their song and leap into the air, each in turn, always rising to the same height and always descending upon the exact spot from which they rose. But if they discover that they are watched by enemies, they disappear. They also live in South America.

They have a rival in the hoopoe, a lovely European bird which would regularly make its home in England but for the guns of "sportsmen" who think it manly to shoot them. It is of a rich russet hue, with a beautiful crest upon the head and with wings marked out in black and white. Its mortal enemy is the hawk. The moment one approaches, the hoopoe lays itself flat on the ground, lowers its crest, and spreads out its wings, and what looks like a little heap of rags remains safe, unsuspected.

THE COCK-OF-THE-ROCK, THE BLACK-HEADED NUN, AND THE TINY TROGON

Returning to the chatterers, we must notice the brilliant Brazilian cock-of-the-rock, famous for the great crest which hides its nostrils, and the resplendent orange plumage, for the sake of which the unfortunate bird is mercilessly shot. The crest of the cock-of-the-rock brings to mind the bird which is in many respects like a cuckoo, the plantain-eater. But it is far handsomer

than that bird, with its crest and gay plumage, and of far larger size. When perched at the top of the high trees in which it makes its home, it gambols and plays and mews like a cat. There is another bird, a little one, the black-headed nun, which mews, too, but like a tiny kitten. Another gaudy crested bird is the trogon, of which an American species, called the quetzal, is distinguished by a long tail. It is the national bird of Guatemala, and its portrait appears on Guatemalan postage-stamps.

All the birds considered in this story so far are day birds, but we have several which go out to work with the bats and owls, and all are dull in color, though sometimes wearing curious ornaments. One of these is the night hawk, often seen high in air at sunset. Another is familiar to the ear if not to the eye, taking its name *whippoorwill* from its cry. A third is a big southern species called chuck-will's-widow. Each of these birds feeds on insects caught as it flies. It is a friend of the farmer, and a handsome one, with its beautiful mottled plumage.

BEAUTY, BIRDS THAT DIE TO MAKE A WOMAN'S HAT

One member of this bird's family has enormously long streamers in its tail, while another has feathers which float far out behind the flying bird, the web of the feather growing from the tip half-way up, and leaving the upper half bare. The proper name of this bird is the nightjar.

The birds of which we have been reading help to make the world more lovely. The world would be a dull place without the wonderful color of birds and flowers, and we ought to hate everything that robs the world of its beauty and makes it in any way a less lovely place. A cruel fashion has for many years encouraged women to wear fine feathers that can only be had by destroying beautiful birds, often with great cruelty. But more and more these fashions are dying out, and gentlewomen are more and more refusing to wear a hat made beautiful by such cruel means. So that in the future the birds of beauty will, let us hope, have fewer enemies than they have had in the past, and will live and flourish and help to make the world a beautiful place to live in.

THE NEXT STORIES OF NATURE BEGIN ON PAGE 1225.

The Book of FAMILIAR THINGS

LETTY'S GLOBE

When Letty had scarce pass'd her third glad year,
And her young, artless words began to flow,
One day we gave the child a colour'd sphere
Of the wide earth, that she might mark and know,
By tint and outline, all its sea and land.
She patted all the world; old empires peep'd
Between her baby fingers; her soft hand
Was welcome at all frontiers. How she leap'd
And laugh'd, and prattled in her world-wide bliss:
But when we turn'd her sweet unlearned eyes
On our own isle, she rais'd a joyous cry,
"Oh! yea, I see it, Letty's home is there!"
And while she hid all England with a kiss,
Bright over Europe fell her golden hair.

C. TENNYSON-TURNER.



HOW THE MAPS ARE MADE

HAS it ever struck you as a wonderful fact how it comes about that a picture of the world, which is a round ball, can be drawn on a flat piece of paper? Try to make a piece of paper fit round a globe, and you will see how impossible it is.

It is impossible to make a perfectly true picture of the round earth on a flat piece of paper. And let us say at once that no map in the world, however beautifully it may be done, is really quite true. Every map is wrong—just a little wrong; but this small amount of error does not matter, *because it is known*. Error is only dangerous where it is unknown. Where it is known, we are aware of it, and make allowance for it. That is important to remember always.

In a map we can see exactly what is the shape of a country, and which are the oceans that sweep against its shores. But in such a picture as a map of America we should never see how the land lies between New York and Boston, and so we split up the earth into smaller pictures still. We make maps of France, maps of Germany, and maps of England. Here we can see the chief rivers of these countries, and their mountains or hills, and the names of their chief towns. But we are not yet satisfied, and so we split up the earth into

CONTINUED FROM 1658

smaller pictures. We make up maps of counties, or even of little districts and single towns, so that men may spread these pictures before them and know exactly what the places are like in every detail. You have often seen a traveler wandering through a city like Chicago with a map in his hand. It is wonderful to think that he, who is so small in the midst of even our streets, yet holds in his hand a picture of the whole great city.

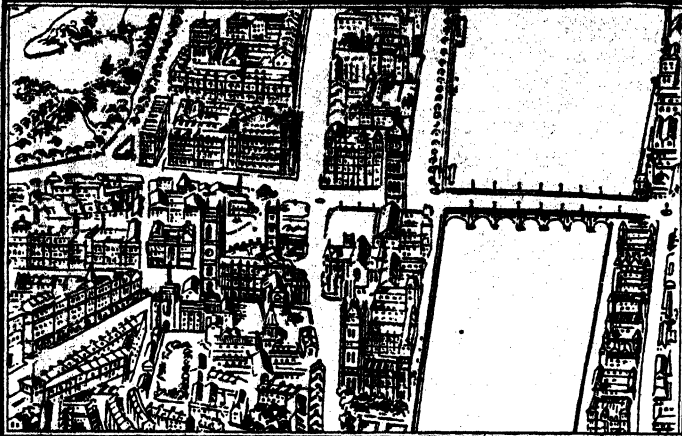
But a child may hold in his hands a picture of the whole world. We have made our little tiny maps, bit by bit, and then we have added these together, and the whole picture makes up the picture of the earth, and a little child can hold it in its hands. If you will take into your hands a school-room globe, or a map of the two hemispheres, and think what these things really mean, it will help you to understand how interesting and also how wonderful map-making is.

For you hold in your hands, which are very small and weak, the picture of the vast earth, which has millions of men and women living upon it, millions of animals, millions of trees, and which consists of tremendous mountain ranges, enormous oceans, and vast continents of land. Man has been able, you see, to make so tiny a picture of the earth that a child can hold it, study it, and understand

it. Now, maps and globes are interesting things to study and look at and wonder about, but it is in the books written concerning these maps and globes that we really learn how interesting is the world on which we live.

will be able to see precisely where the different details of the picture touch the lines, and so he will be able to make his own picture in that respect an exact copy of the other.

It is something like this in drawing



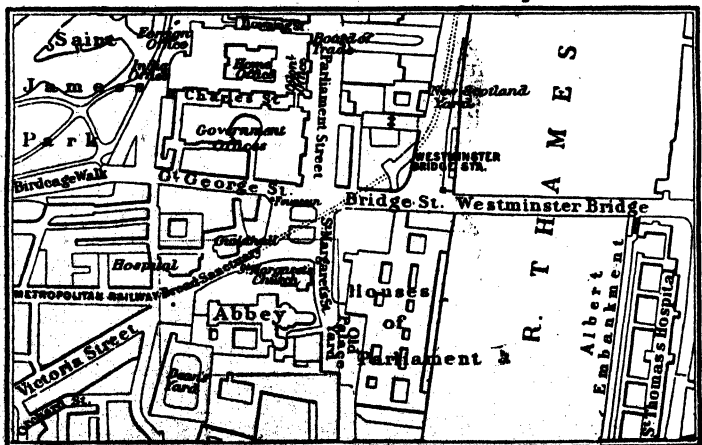
This is a birdseye view of the part of London that lies round the Houses of Parliament. Even if we could take a picture of the whole of London from a balloon, it would be hard to find our way from it, so crowded is the great city.

And so we are going to read about all the interesting things man has discovered about the different lands which make up the earth. We shall then be able to look at a map and feel that we know what kind of climate a country has, what kinds of wild animals wander there, how the people earn food and clothes for themselves in that part of the world, and what trees and flowers and plants grow there; we shall come to know everything that is to be known about this wonderful earth on which we live.

Now let us start and see how a picture of the earth can be made. Have you ever seen an artist copying another artist's picture? If he wishes to be quite accurate in his copy, he will draw a number of lines up and down the picture he is copying, and then lines across it, and then he will draw exactly the same lines on his canvas or piece of paper. When he has done this, he

a picture of the earth. Men make a round globe, and mark upon it where the North Pole should be and where the South Pole should be. After that they draw a number of lines from the North Pole to the South Pole downwards and across the globe. The lines that run downwards they call *meridians of longitude*, and the lines that run round the globe they call *parallels of latitude*. There

are 360 meridians, or degrees, of longitude, and the space between each at the Equator measures one degree, or 60 geographical miles. Every tenth meridian is usually shown on the globe. The parallels of latitude are drawn in



This is a map of the part of London shown above, with the streets made clear. It is quite easy for anyone holding plans like this to find the way. Though you would only appear as a dot on this plan, you can hold in your hand a map showing the whole of a city with the names of the streets and buildings on it.

a different way. A line is first drawn right round the globe in the centre; this is called the Equator. Then eight lines are drawn above the Equator, and eight below it, making seventeen in all. The degrees between each of

HOW A MAP IS MADE

these lines is also counted ten. The Equator line is marked nought, and the lines then go 10, 20, 30, 40, 50, 60, 70, 80, up to the North Pole, which is marked 90, and 10 to 80 in the same way down to the South Pole, which is also marked 90.

So now you see that the globe is lined and crossed all over, like a bird-cage, or like that copy-picture of which we spoke a moment ago. It is, therefore, easy enough to put in the different countries. All that we require is the report of sailors, who come back from sailing about the world with tales of new lands. They know exactly how the shape and points of these new lands touch and come away from the meridians of longitude and the parallels of latitude; and as soon as they tell us on which degrees of latitude and longitude such a place is situate, we can safely mark it in on our globe.

But what are we to do about maps? People cannot put a globe in their pocket when they go a journey, and, nice enough as globes are, they cannot be made big enough to give us all the details we want to know about the earth. So we have to try to reproduce on a flat piece of paper the picture of the earth that we have painted on the globe. Perhaps you have heard the name Mercator. "Mercator's Projection" is found in every good atlas. Mercator's real name was Gerhard Kramer; he was a German, and lived in the sixteenth century. To him, and an Englishman named Edward Wright, we owe the wonderful maps which are called "Mercator's Projection."

Let us see if we can understand Mercator's Projection. It is obtained

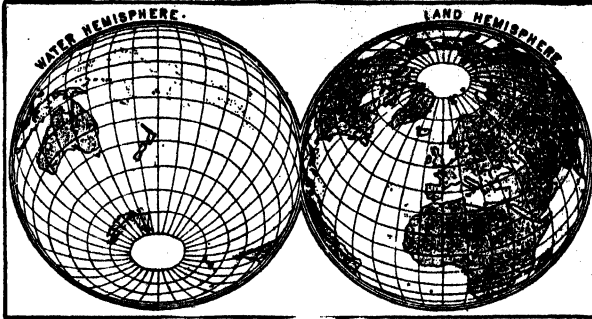
by placing a cylinder of paper round a properly marked glass globe, and by means of a light getting the shadows of the meridians and parallels thrown upon the paper. These shadows are drawn, and when the scroll or cylinder of paper is stretched out, we find that the curved lines on the globe appear upon it in

perfectly straight lines, up and down, and from side to side. Instead of troublesome curves, which would sadly trouble a mariner in shaping his vessel's

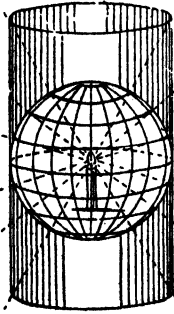
course, we have on these maps straight, clean lines. It is true that these shadow lines are not quite accurate, and that on a Mercator's map certain countries appear larger than they really are. But the shape of these countries is quite accurate, and sailors need never make a mistake if they go by this wonderful map.

We must not suppose that the end of map-making has come. Even if Mercator's Projection lasts for hundreds of years, the business of map-making will still go on. For our business now lies in *filling up the picture*. There are many parts of the earth about which we know scarcely anything. Towns may exist of which no man at present knows the name. Hidden deep in the midst of enormous continents, there may be living at the present moment races of men and women of whom we know nothing — people who never heard of the balloon, the telephone, the motor-car, or the railway engine.

And so it is that the map-maker sits at home waiting for the explorer to return with wonder-tales of towns and lakes and mountains, ready to add another touch to his picture of the earth.



Here are two views of the globe, showing the land and the water. They are called hemispheres, which means half the globe. The lines running down are called meridians of longitude; those that run round are called degrees of latitude.



This picture shows the way the Mercator's projection map of the world is made. By placing a light inside a glass globe with the lines of latitude and longitude marked on it, shadows of the lines are thrown on a scroll of paper round the globe, and these lines are drawn on the paper.

THE NEXT FAMILIAR THINGS BEGIN ON PAGE 1997.

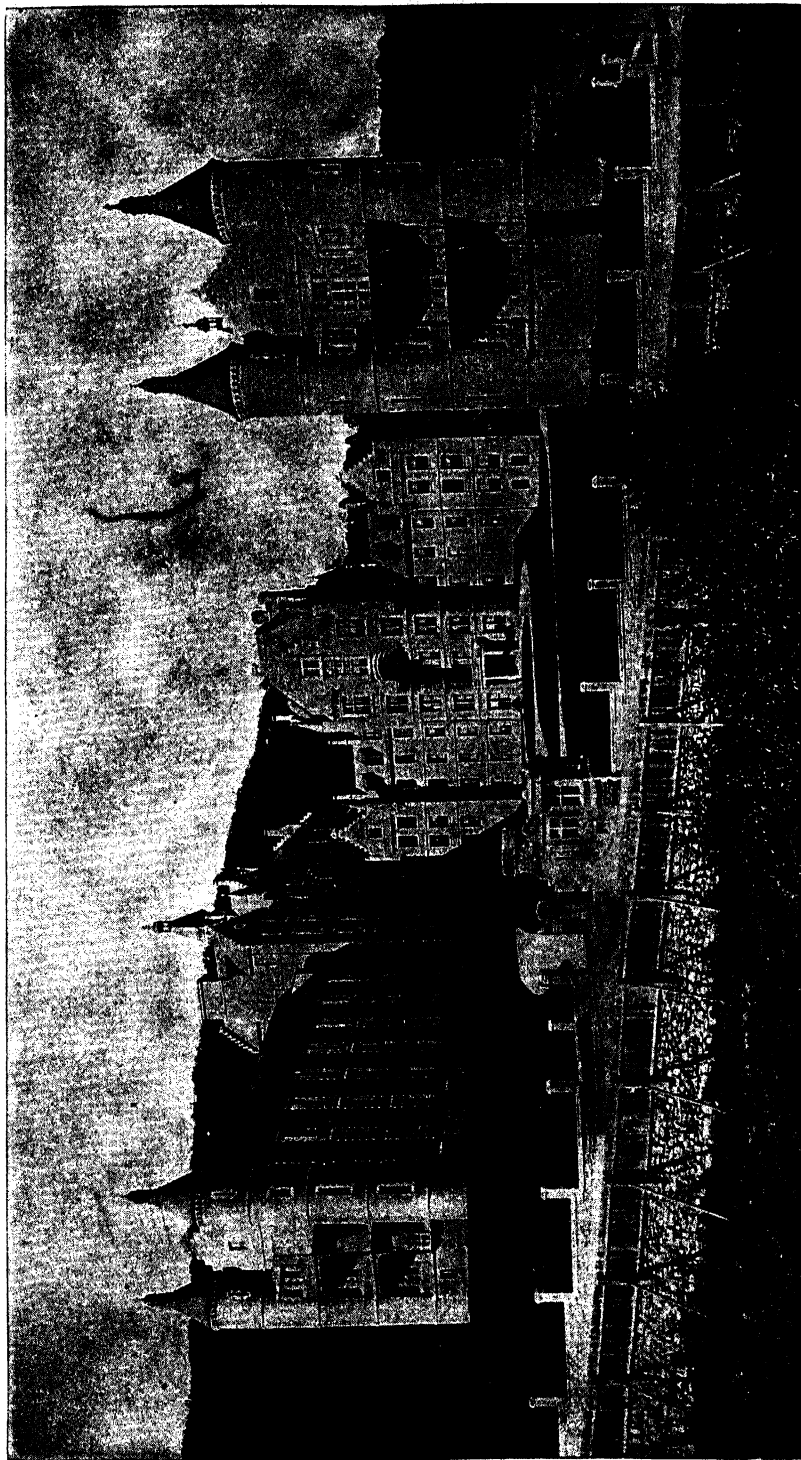
A GENERAL VIEW OF MCGILL UNIVERSITY, MONTREAL



Photograph by Notman, Montreal.

The large number of well-equipped colleges and universities shows the Canadian attitude toward education. Among her universities, none surpasses McGill, a general view of which you see above. The bequest of the original founder, James McGill, has been followed by many magnificent gifts, which have enabled the faculties to develop an institution which is now known over the whole world. Several separate colleges are affiliated with the university, and its advantages are also open to women. As you may see from this picture, the university is beautifully situated. The long avenue lined with college buildings has a particularly fine effect.

THE ROYAL VICTORIA HOSPITAL IN MONTREAL



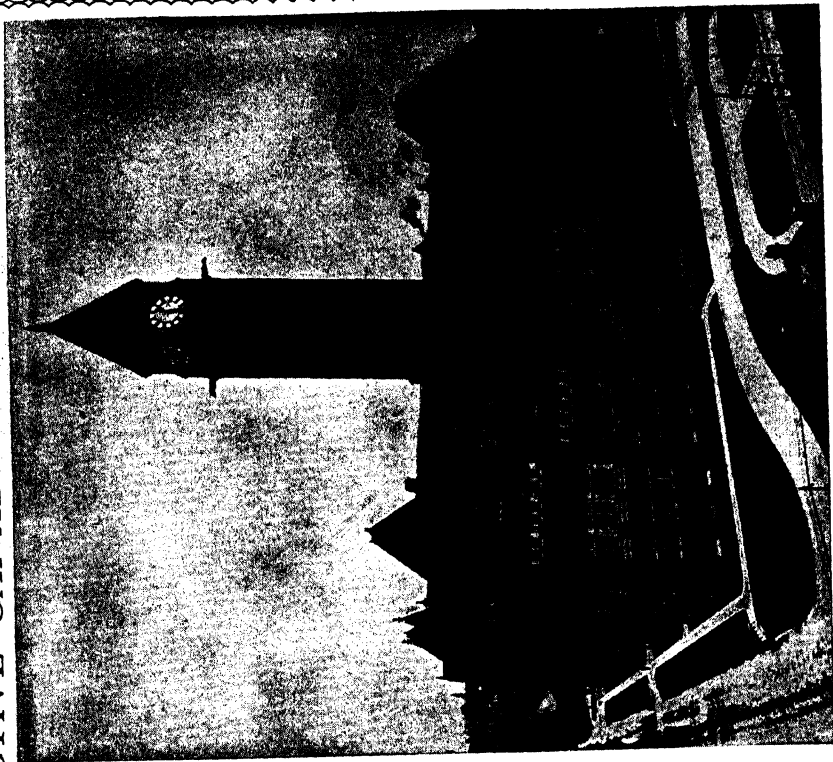
Photograph by Notman, Montreal.

The Royal Victoria Hospital in Montreal is one of the best equipped institutions in America. It stands on the slope of Mount Royal, almost directly behind the grounds of McGill University, and is a monument to the wise generosity of Lord Mount Stephen and Lord Strathcona, of whose successful careers you may read in another volume. Many Canadian girls have taken up the profession of nursing and have been very successful. The medical schools of Canada have a world-wide reputation for excellence, and a part of this is due to the fine opportunities for training and observation given to them by the great hospitals of the Dominion.

TWO IMPORTANT AND EFFECTIVE CANADIAN BUILDINGS



Photograph by Notman, Montreal.
From any elevated point in Montreal the frequency of church spires impresses every visitor. This is Christchurch Cathedral, the centre for the Anglican Church, in and around Montreal. It stands on St. Catherine Street, between University Street and Union Avenue. The cathedral was erected in 1859, and is effective and pleasing.



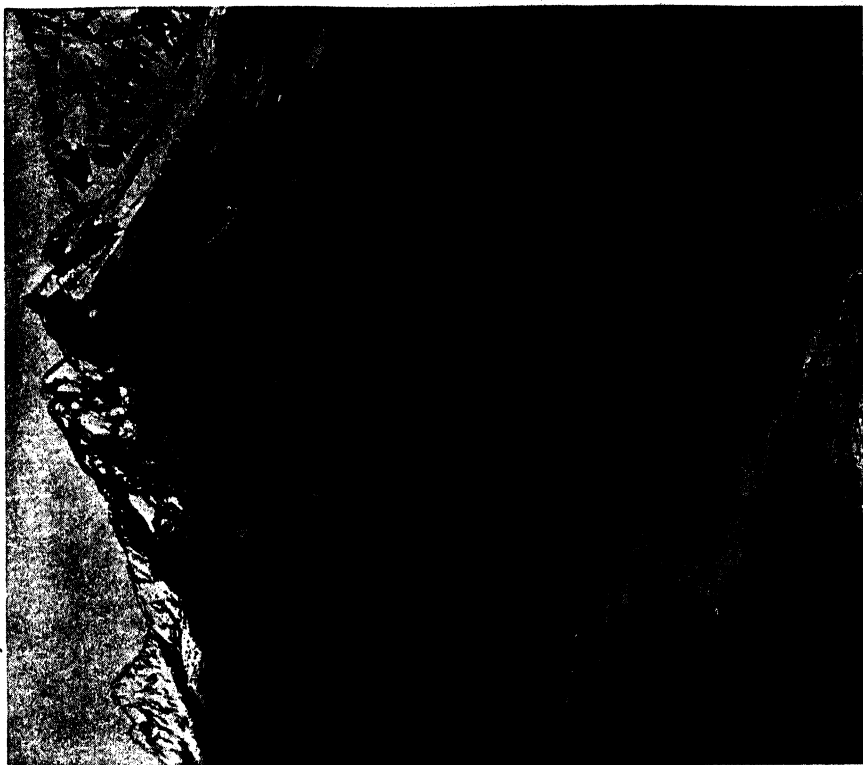
Photograph by Pringle and Booth, Toronto.
Few cities with twice the population of Toronto can boast a municipal building so extensive and so imposing. The City Hall shown above was completed in 1899 at a cost of about \$5,000,000. The central tower is 300 feet high, and affords an excellent view of the city. The building stands on Queen Street, not far from Osgoode Hall.

THE GRANDEUR OF NATURE, EAST AND WEST



Photograph by Notman, Montreal.

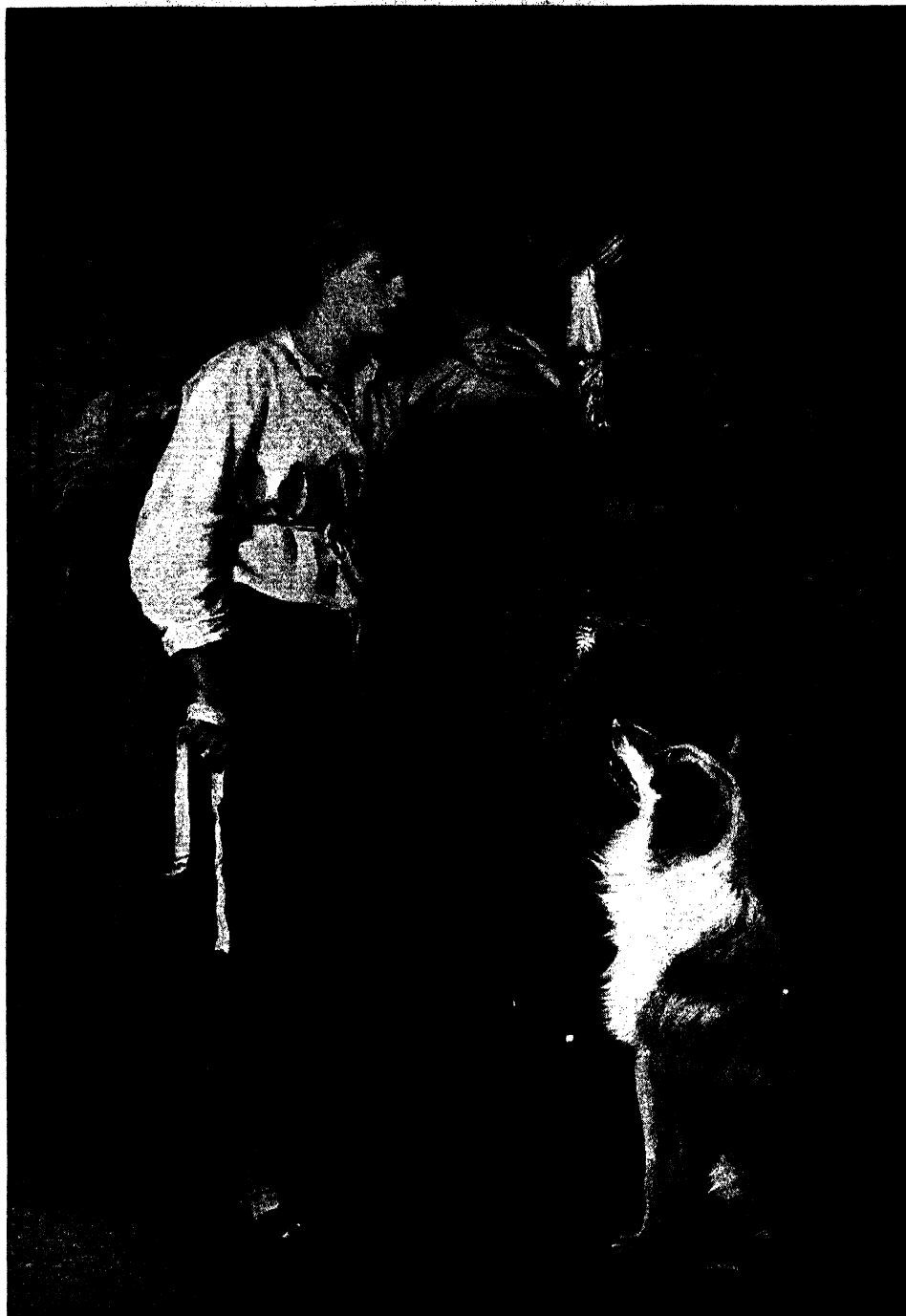
The Saguenay River is a deep, swift between rocks rising high above the water, which is generally hundreds of feet deep. About thirty-three miles from Tadoussac, where it joins the St. Lawrence, Trinity Cape or Trinity Rock rises 1,500 feet in three great steps—much higher than the picture shows. Cape Eternity is across the river.



Photograph by courtesy of the Canadian Pacific Railway.

The Selkirk Range contains some of the most wonderful mountain scenery in the world, and no part of it is more fascinating than the Illecillewaet Valley, where the railroad follows the river valley, often crossing the stream, while the snow-covered mountains tower above. You can see the railroad bridge in the foreground.

THE SAD AND BEAUTIFUL EFFIE DEANS



This painting by Sir John Millais shows the young and beautiful but unhappy Scotswoman, Effie Deans, and her sweetheart, George Staunton, whose wife she became. Poor Effie was fated to undergo a terrible trial, as an old sweetheart of Staunton's, out of jealousy, stole their child, and Effie was accused of its death. Her sister Jeanie walked from Edinburgh to London, and pleaded with the queen to have Effie pardoned for a crime of which the poor woman was later proved innocent. This story is told in "The Heart of Midlothian."

The Story of FAMOUS BOOKS

THE WAVERLEY NOVELS

THE last two of Scott's novels which we are to read here are "The Heart of Midlothian" and "Old Mortality." The former is one of his great stories, and the heroine, Jeanie Deans, is one of the finest characters in fiction. She is drawn from real life. "Old Mortality" was the name given to an old man who used to wander about the graveyards in Scotland, keeping clean the inscriptions on the tombstones of the Covenanters, thus showing his love for those who had fought the good fight for religious liberty. The story named after him tells of the ruthless attempt made by the Governments of Charles II. and James II. to force episcopacy, or the government of the Church by bishops, upon the people of Scotland, who hated that form of religious control. The Covenanters were people pledged to a covenant, or sacred bond, which bound them to stand together in opposition to the projects of the king in 1638, and to oppose Papacy and preserve the Reformed Church of Scotland.

A WOMAN'S HEROISM

BEING THE STORY OF "THE HEART OF MIDLOTHIAN"

MARGARET
MURDOCKSON

was the wife of a favorite servant of a clergyman named Staunton, rector of Willingham. She had a daughter; Mr. Staunton had a son. The daughter was a beautiful but very unsettled girl; the rector's son was equally foolish, and his father sent him abroad.

George, as the young man was named, resolved never to see his father again. He led a life of wild adventure. Arriving in Scotland, he became acquainted with one Wilson, a smuggler. He also became acquainted with Effie Deans, the daughter of a Scottish peasant. He planned to run away to some retreat with Effie Deans.

About this time a friend tried to bring about friendliness between father and son. The father sent his son a large sum of money, but wrote disowning him for ever. Stung by this letter, George Staunton joined Wilson in a perilous smuggling adventure. The two men were captured and condemned. By the self-sacrifice of Wilson, however, Staunton escaped.

Meanwhile, Effie Deans was arrested and condemned for causing the death of their little child. As a matter of fact, the infant had been stolen away by Madge Wildfire, the daughter of Margaret Murdockson.

CONTINUED FROM 1670



Convinced of her half-sister's innocence, Jeanie Deans, who, because of Effie's trouble, kept her own lover, Reuben Butler, a Presbyterian minister, at a distance, decided to walk to London to petition the king (George II.) for a pardon. Jeanie, when she arrived in London, was fortunate enough to enlist the sympathy of the Duke of Argyll, and by this nobleman's influence was enabled to see the queen. The description of this interview, which took place in one of the Royal gardens at Richmond, is one of the finest passages in the whole book.

The duke explained the singular law under which Effie Deans had received sentence of death, and detailed the affectionate exertions which Jeanie had made on behalf of her sister, for whose sake she was willing to sacrifice all but truth and conscience.

Queen Caroline listened with attention. She was rather fond, it must be remembered, of an argument, and soon found matter in what the duke told her for raising objections to his request.

"It appears to me, my lord," she replied, "that this is a severe law. But still, it is adopted upon good grounds, I am bound to suppose, as the law of the country, and the girl has been convicted under it. The

very presumptions which the law construes into a positive proof of guilt exist in her case; and all that your Grace has said concerning the possibility of her innocence may be a very good argument for annulling the Act of Parliament, but cannot, while it stands good, be admitted in favor of any individual convicted upon the statute."

The duke saw and avoided the snare, for he was conscious that, by replying to the argument, he must have been inevitably led to a discussion, in the course of which the queen was likely to be hardened in her own opinion, until she became obliged, out of mere respect to consistency, to let the criminal suffer.

HOW JEANIE DEANS PLEADED FOR HER SISTER BEFORE QUEEN CAROLINE

"If your Majesty," he said, "would condescend to hear my poor country-woman herself, perhaps she may find an advocate in your own heart, more able than I am, to combat the doubts suggested by your understanding."

The queen seemed to consent, and the duke made a signal for Jeanie to advance from the spot where she had hitherto remained. Her Majesty could not help smiling at the awe-struck manner in which the quiet, demure figure of the little Scotswoman advanced towards her, and yet more at the first sound of her broad Northern accent.

But Jeanie had a voice low and sweetly toned, an admirable thing in woman, and besought "her leddyship to have pity on a poor misguided young creature," in tones so affecting that, like the notes of some of her native songs, provincial vulgarity was lost in pathos.

"Stand up, young woman," said the queen, but in a kind tone. And, after a few questions as to the Scottish laws, her Majesty asked how Jeanie had traveled up from Scotland.

JEANIE DESCRIBES HER LONG WALK FROM EDINBURGH TO LONDON

"Upon my foot mostly, madam," was the reply.

"What, all that immense way on foot? How far can you walk in a day?"

"Five-and-twenty miles and a bit-tock."

"And a what?" said the queen, looking towards the Duke of Argyll.

"And about five miles more," replied the duke.

"And I thought I was a good walker," said the queen; "but this shames me."

"May your leddyship never hae sae weary a heart that ye canna be sensible of the weariness of the limbs," said Jeanie.

"That came better off," thought the duke. "It's the first thing she has said to the purpose."

Poor Jeanie, it should be explained, had uttered certain remarks that could have borne a special and, for her, a dangerous meaning, in her replies to the queen's inquiries; and it had been arranged that when she trod on dangerous ground the duke should raise his hand to his chin.

"And I didna just a'thegither walk the hail way neither, for I had whiles the cast of a cart; and I had the cast of a horse from Ferrybridge and divers other easements," said Jeanie, cutting short her story, for she observed the duke made the sign he had fixed upon.

"With all these accommodations," answered the queen, "you must have had a very fatiguing journey, and, I fear, to little purpose; since, if the king were to pardon your sister, in all probability it would do her little good, for I suppose your people of Edinburgh would hang her out of spite?"

HOW JEANIE DEANS PROVED A MATCH FOR THE QUEEN IN CAUTIOUS SPEECH

This reference was to the Porteous Riots, with a description of which the story opens. Captain Porteous commanded the guard at the execution of Wilson, the smuggler, and, fearing a rescue after the escape of Staunton, ordered his men to fire on the mob. Seventeen persons were killed or wounded. About two months later—on June 22nd, 1736—Porteous was found guilty of murder. The king being then in Hanover, the queen granted Porteous a reprieve. At night the mob broke open the prison, the old Tolbooth or "Heart of Midlothian," as it was called, took out the officer, and hanged him to a post in the Grassmarket.

"She will sink herself now outright," thought the duke. But he was wrong.

"She was confident," she said, "that baith town and country wad rejoice to see his Majesty taking compassion on a poor unfriended creature."

"Hark, you young woman, had you any friends engaged in the Porteous mob?"

"No, madam," answered Jeanie, happy that the question was so framed that she could, with a good conscience, answer it in the negative.

"But I suppose," continued the queen, "if you were possessed of such a secret, you would hold it a matter of conscience to keep it to yourself?"

"I would pray to be directed and guided what was the line of duty, madam," answered Jeanie.

"Yes; and take that which suited your own inclinations," was the reply.

ONE WORD FROM THE KING'S MOUTH AND HOW MUCH IT MIGHT DO

"If it like you, madam," said Jeanie, "I would hae gaen to the end of the earth to save the life of John Porteous, or any other unhappy man in his condition; but I might lawfully doubt how far I am called upon to be the avenger of his blood, though it may become the civil magistrate to do so. He is dead and gane to his place, and they that have slain him must answer for their ain act. But my sister, my puir sister, Effie, still lives, though her days and hours are numbered!"

"She still lives, and a word of the king's mouth might restore her to a broken-hearted old man, that never in his daily and nightly exercise forgot to pray that his Majesty might be blessed with a long and prosperous reign, and that his throne and the throne of his posterity might be established in righteousness.

"Oh, madam, if ever ye kend what it was to sorrow for, and with, a sinning and a suffering creature, whose mind is so tossed that she can be neither ca'd fit to live or die, have some compassion on our misery! Save an honest house from dishonor, and an unhappy girl from a dreadful death!"

THE POWER AND PATHOS OF AN HONEST WOMAN'S SIMPLE WORDS

"Alas! It is not when we sleep soft and wake merrily ourselves that we think on other people's sufferings. Our hearts are waxed light within us then, and we are for righting our ain wrangs and fighting our ain battles. But when the hour of trouble comes to the mind or to the body—and seldom may it visit your leddyship—and when the hour of death comes, that comes to high and low—lang and late may it be yours! Oh, my leddy, then it isna what we have dune for oursel's, but what we hae dune

for others, that we think on maist pleasantly. And the thought that ye hae intervened to spare the puir thing's life will be sweeter in that hour, come when it may, than if a word of your mouth could hang the hail Porteous mob at the tail of a tow."

Tear followed tear down Jeanie's cheeks as, her features glowing and quivering with emotion, she pleaded her sister's cause with a pathos which was at once simple and solemn.

"This is eloquence," said her Majesty to the Duke of Argyll. "Young woman," she continued, addressing herself to Jeanie, "I cannot grant a pardon to your sister; but you shall not want any warm intercession with his Majesty. Take this housewife case," she continued, putting a small embroidered needle-case into Jeanie's hands; "do not open it now, but at your leisure—you will find something in it which will remind you that you have had an interview with Queen Caroline."

QUEEN CAROLINE'S GIFT TO JEANIE AND HOW SHE KEPT HER PROMISE

Thus ended the interview. Inside the needle-case was the usual assortment of silk and needles, with scissors, tweezers, etc., and in the pocket was a bank-bill for fifty pounds (\$250).

Jeanie was delighted with the case, especially as it bore the queen's name, but was with difficulty persuaded by the duke to retain the bank-note, as that seemed so very large a sum of money to the poor Scotswoman.

Queen Caroline kept her promise, and Effie Deans was pardoned. Staunton succeeded to his family title with Effie as his wife. Soon afterwards, however, he was shot by a gipsy boy, who turned out to be his own son, who had been carried away by Madge Wildfire, and for whose supposed murder Effie had almost suffered death. So that in the death of Staunton there was a tragic retribution.

Effie retired to a convent, and Jeanie married Reuben Butler, the minister who had been her faithful friend throughout her troubles.

"Happy in each other, in the prosperity of their family, and the love and honor of all who knew them, this simple pair lived beloved, and died lamented," are the last words of the author on the devoted Jeanie and her husband, Reuben.

IN THE DAYS OF THE COVENANTERS BEING THE STORY OF "OLD MORTALITY"

THE story begins on the morning of May 5th, 1679, when the annual "Wapinschaw," or weapon-show, was being held in the upper ward of Clydesdale. This festival, which the authorities favored because it attracted young men to military exercises and sports, was regarded by the Presbyterians with disfavor. At the festival each Crown vassal was required to appear with such muster of men and armor as he was bound to make by his "fief"—which meant a piece of land held on condition of military service.

THE THREE YOUNG MEN WHO WERE SHOOTING AT THE POPINJAY

One of the sports was that of shooting at the popinjay. In this three young men greatly distinguished themselves. They were Lord Evandale, a suitor of Edith Bellenden, granddaughter of Lady Margaret Bellenden, of the Tower of Tillietudlem; Henry Morton, son of a deceased Presbyterian colonel; and a young man of humble rank, who kept his face muffled in his cloak. The issue was between Lord Evandale and Henry Morton, and the latter won, to the dissatisfaction, among others, of Lady Margaret, whose husband had fallen in one of the battles in which Colonel Morton, of Milnwood, had taken part before he joined the Royalists.

Among the merry-makers at the Wapinschaw were a sergeant and a private of Claverhouse's Life Guards, Bothwell and Halliwell by name. It suited the humor of Bothwell to test the loyalty of a stranger who was among them. Dissatisfied by the stranger's manner of drinking the toast put to him, Bothwell was proceeding to stronger measures, when Morton intervened on the stranger's behalf.

THE STRANGER AT THE SPORTS AND HIS CHALLENGE TO SERGEANT BOTHWELL

The man, however, stepped forward, and, saying that this was his quarrel, asked the sergeant if he would wrestle a fall with him. Bothwell gallantly responded, but at the third close was so violently thrown that he lay for an instant stunned and senseless. The two then shook hands, and the stranger,

whose name was John Balfour of Burley, having secured Morton's companionship in his journey, mounted his horse and rode off.

Shortly afterwards a cornet brought news that the Archbishop of St. Andrews, whose health Bothwell had given to Burley, had been murdered. When Bothwell heard this he recalled the fact that when Burley had responded to the toast given to him he had used these words: "The Archbishop of St. Andrews, and the place he now worthily holds; may each prelate in Scotland soon be as the Right Reverend James Sharp"—who was assassinated. Bothwell now understood the reference, and quickly identified his late opponent with the commander of a band of zealous Covenanters.

On their way to Milnwood, where Morton lived with a miserly uncle, he learned from Burley that his companion had once saved his father's life in the battle of Longmarston Moor. This news strongly affected his attitude towards Burley's attempts to influence him in favor of the Covenanters or Presbyterian party.

HOW THE STRANGER WAS PURSUED AND ESCAPED FROM THE TROOPERS

Burley pursued his advantage when they heard from an old dame that the path which Burley had decided to take on bidding Morton farewell had been occupied by troopers. Morton, who knew nothing of the fate of the Archbishop of St. Andrews, was induced secretly to give Burley shelter for the night in his uncle's house, or rather in the hay-loft of a stable adjacent to the dwelling.

Very soon afterwards Morton was alarmed at the halting of a body of cavalry on the high road which wound round the foot of the bank on which the house of Milnwood was placed. The officer was on the point of ordering the house to be searched, when one of his party was heard to say:

"I cannot think it at all necessary. Milnwood is an infirm old man, who never meddles with politics, and loves his money-bags and bonds better than anything else in the world. His nephew, I hear, was at the Wapinschaw to-day,

and gained the popinjay, which does not look like a fanatic. I should think they are all gone to bed long since, and an alarm at this time of night might kill the poor old man."

So the cavalry passed on, and Morton, without exciting the alarm of the domestic, Mrs. Alison, who had been staying up for him, was able to take refreshments to the fugitive. The two parted in the morning. Despite all that Burley could say, and greatly to his mortification, Morton's answer to all his

served, was driven to this wish by his apparently hopeless love for Miss Bellen-den and his uncle's miserliness.

After the Wapinschaw, Lady Margaret Bellenden dismissed from her service an old woman named Mause Headrigg and her son Cuddie, because of the absence of the latter from the festival. They were recommended to Morton by Miss Edith Bellenden, and Cuddie—who, as a matter of fact, was the third competitor in the final shoot for the popinjay—entered Morton's ser-

A RELIGIOUS SERVICE OF THE COVENANTERS ON THE LONELY MOOR



The story of "Old Mortality" describes the persecution of the Covenanters of Scotland in the time of Charles II. and James II., when men and women who refused to be forced by the Government into the system of religious worship approved by the State were hunted on the moors and in the glens of Scotland by the soldiers of the king. The Covenanters fought and bled for their faith and the liberty to worship God in their own simple way. For years they could not meet in their old churches, but gathered for worship, as we see them here, on the lonely moors, with scouts posted on the look-out for the troops.

inducements to "gird on his sword in the dear and precious cause" of the Covenant was that he was determined, "at least, as far and as long as possible, to unite the duties of a good Christian with those of a peaceful subject."

When Burley had ridden away, Morton had a somewhat stormy interview with his uncle, to whom he expressed a wish to leave the country and serve abroad, as his father had done before him. Morton, it should be ob-

vice. But Mause had come under the influence of the Covenanters, and when Morton confessed to Bothwell that he had given shelter to Burley, Mause delivered such a speech against the episcopal party that there was nothing for her and her son to do but resume their travels. As for Morton, he was taken prisoner and carried to the Tower of Tillietudlem. Bothwell, being disposed to be friendly, allowed his prisoner to be muffled up in one of the soldier's

cloaks, and consented for the time being to keep from mentioning his name.

When the party had arrived at the tower, they were given permission to rest there till the arrival on the morrow of Claverhouse, and provision was made for the safe custody of the prisoner. Miss Edith had a servant named Jenny Dennison, and both were much concerned to know the name of the prisoner. Jennie had many suitors, one of whom was a trooper named Tam Halliday.

THE HERO HAS TO FACE THE DREADED PERSECUTOR OF THE COVENANTERS

It was from Tam that she found out Morton's identity, and it was by the assistance of Tam that she was enabled to secure her mistress, muffled in a plaid, and described as her kinswoman, an interview with the prisoner. On learning the reason of Morton's captivity, and that he would be brought before Claverhouse, whose intimate friend and early patron the murdered archbishop had been, Miss Bellenden bade her maid find a messenger to take a missive to Major Bellenden, her uncle, who, she thought, could help Morton out of the trouble into which he had unwittingly fallen. The major was Morton's friend, and arrived at the tower shortly before the man in whose hands the fate of young Morton would lie.

On the arrival of Claverhouse, it was made known that Lord Evandale had been despatched to disperse a conventicle, or gathering, of the Covenanters, who had become especially bold. And just after Major Bellenden had appealed without success to Claverhouse on Morton's behalf, Evandale arrived with the news that a large body of Covenanters were in arms among the hills, and had broken out into actual rebellion.

MORTON IS CONDEMNED TO DEATH, BUT HAS FRIENDS IN HIS HOUR OF NEED

When Sergeant Bothwell went to Morton to take him before Claverhouse, he acquainted him with the news that Miss Bellenden had sought young Lord Evandale's help on his behalf; and this caused him to arrive at the conclusion, not for the first time, that his own suit had little chance of success, apart from his present predicament.

After a heated interview, Morton, who questioned the soldier's right to arrest him without a warrant, was condemned

to death by Claverhouse, who refused to listen to the appeals of the major, although these were seconded by Lady Margaret. It was only on Lord Evandale's intervention that Claverhouse relented. And in giving way so far as to rescind the death sentence, the colonel, as he then was, warned his young friend against letting his private feelings stand in the way of his duty, adding that, from Morton's manner, it was certain that, if he should ever come to head an army of rebels, Evandale would have much to answer for. Whilst Evandale was distressed at the obvious concern for Morton's safety shown by Miss Bellenden, Morton, who had misunderstood some words he had heard fall from the young lady's lips, was mortified at the thought of being indebted for his life to his rival.

When Claverhouse set forth in pursuit of the Covenanters, Morton and three companions in captivity traveled in the custody of a small body of soldiers, who formed the rearguard to the column under the command of Claverhouse, and were immediately under the charge of Sergeant Bothwell.

THE INJUSTICE THAT MADE A LOYAL SUBJECT AN ENEMY OF THE KING

Morton's companions were Cuddie and Mause Headrigg and a zealous preacher named Gabriel Kettledrummy. The arrest of Cuddie on account of his mother's opinions added to Morton's sense of what he now regarded as the infamous and intolerable oppression of his countrymen in a free land.

Claverhouse's column was attacked by an overpowering number of the enemy, who were posted on Loudon Hill. On Evandale's suggestion it was decided, against the commander's own inclination, to parley with the rebels. Evandale wished to be the envoy, but Claverhouse willed it that his nephew and heir, Cornet Grahame, the youngest and hottest of his officers, should take a flag of truce and a trumpeter, and ride down to the edge of the morass dividing the two forces, and summon the rebels to lay down their arms and disperse.

In the parley Cornet Grahame was shot by Burley, who was in command of the Covenanters. The troops were scattered; Bothwell, taken at a disadvantage in a single combat with Burley, was killed; and Lord Evandale

only just managed, with the help of a remnant of troopers, to save Claverhouse, who had been surrounded after a desperate charge in which he had unhorsed Burley.

At a moment when Claverhouse and Evandale were in full flight, a bullet killed the horse which Evandale was riding, and the young man, himself wounded, was about to be struck down by Burley, when Morton, who with his fellow captives was near at hand, intervened. Whilst Burley took up the pursuit of the flying soldiers, Morton aided Evandale to make his escape, thus repaying his indebtedness to Evandale earlier in that eventful day.

Meanwhile Major Bellenden took active measures for the defence of Tillietudlem (supposed to be Craignethan Castle), which was shortly afterwards reached by Claverhouse, who, before pursuing his journey, left some men to assist in defending the tower, pending his return to relieve the garrison.

HENRY MORTON JOINS THE COVENANTERS AND BECOMES A CAPTAIN

When Claverhouse had departed, Evandale rode up in an all but exhausted condition. Then came the news that young Henry Morton was "out with the rebels."

The truth was that Burley had won the young man over. Morton was appointed a captain in the insurgent forces. At the same time he was repelled by the madness of the leaders and appalled at the lack of union in their councils. The news caused Miss Bellenden the deepest distress. This distress was increased when Lord Evandale, in a sortie, the object of which was to get provisions, was made a prisoner by Burley, who threatened to hang him the next morning if the castle were not surrendered.

Morton once again succeeded in saving Evandale's life, giving him his liberty on parole on the understanding that he would act as a mediator with the authorities for the redress of certain grievances which, in Morton's opinion, justified the taking up of arms; and, further, that he induced the garrison of Tillietudlem to surrender on a safe conduct being given to the ladies, the major, and their followers.

On the occupation of Tillietudlem it was decided that Morton should go to the camp of the Duke of Monmouth, in

order to discover upon what terms the insurgents would be permitted to treat with him, the duke being in supreme command of the king's forces. The duke agreed to suspend hostilities for one hour to give the rebels an opportunity to lay down their arms, an act which he said must be the first step to negotiations for peace.

THE DEFEAT OF THE COVENANTERS AND THE PARDON OF HENRY MORTON

Battle ensued, in which the Covenanters were hopelessly routed, partly through the division in their ranks caused by the fanaticism of their leaders. Morton and Cuddie in their flight came upon a lonely farmhouse. Here a number of the most zealous of the Covenanters, with Macbriar and Mucklewrath, two of the ministers who would not listen to Morton's counsel on behalf of peace, were gathered. Morton was made their prisoner, but Cuddie escaped.

For a second time Morton was condemned to death. This time he was rescued by Claverhouse, but became a prisoner of war. His rescue was due to the fact that Cuddie Headrigg had fallen in with Claverhouse's party. Haled before the Privy Council in Edinburgh, Morton consented to go abroad pending his Majesty's pleasure, Claverhouse and Evandale entering themselves as securities for him. Then came the fall of the Stuarts.

THE HERO'S RETURN FROM EXILE AND THE HAPPINESS THAT AWAITED HIM

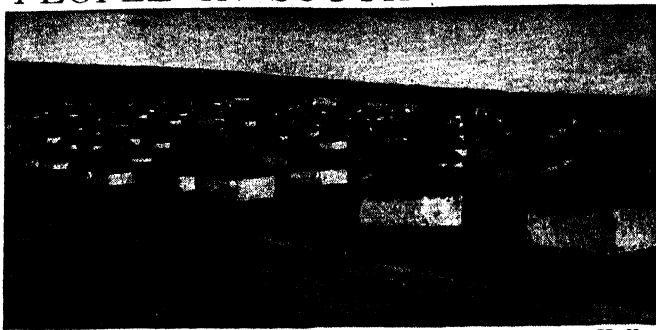
On his return from Holland, believing that Miss Bellenden was engaged to marry Lord Evandale, Morton sought out Burley with the object of obtaining from him a certain document that would restore to her the Castle of Tillietudlem, of which a kinsman, Basil Olifant, had obtained possession. He was unsuccessful. Olifant, aware of Evandale's devotion to the now exiled Stuarts, sought to secure his arrest, and, as resistance was offered, ordered his party to fire. Evandale fell, mortally wounded, but a shot also brought down Olifant, whose death was the means of restoring Tillietudlem to the Bellendens. Morton, who arrived too late on the scene to save Evandale, was some months later married to Edith Bellenden. As to Burley, he died fighting, as did Claverhouse before him.

THE NEXT STORY OF FAMOUS BOOKS IS ON 2025.

LIFE AND PEOPLE IN SOUTH AFRICA



This extraordinary figure, looking like the hideous objects some motorists make themselves, is a native "doctor" in South Africa.



Much of the hardest work in South Africa is done by the Kaffirs. This is how the Kaffir workers in the mines live together, in a small town or "compound," as it is called. These little white huts are much more healthy than the mud buildings seen in the picture on page 1783.



The Boers, or Dutch farmers, were the great colonizers of South Africa. Having bought a large wagon and teams of oxen, the Boer farmer would set forth with his family across the veldt, a great grassy stretch of country without trees, until he came to a fertile district in which to settle and make his farm.

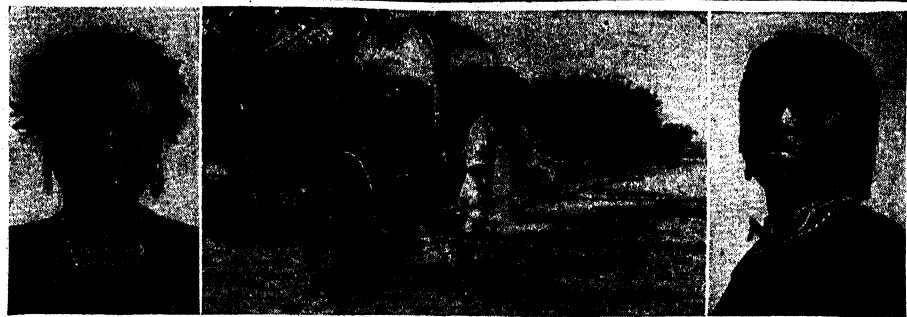


Here are some merry Kaffirs at play after their day's work in a gold-mine. The two men in the foreground are dancing, having decked themselves with some odd European garments.



This Basuto chief has his heart's desire; he has a British uniform and a top hat, a garb different from that worn by his soldier.

These photographs are by Messrs. H. W. Nicholls, N. P. Edwards, and Messrs. Valentine.



PEOPLE OF NATAL

THE BRITISH EMPIRE IN AFRICA

WHEN you look at the map of the world you will generally find that those parts of the earth's surface belonging to the British Empire are printed in red; and you will see that quite a large part of Africa is colored red. Africa is rather like the head and neck of a rhinoceros in shape; with its horn sticking out on the east, and the tip of its nose down south at the Cape of Good Hope. The back of the neck is the coast of the Mediterranean Sea, and the throat is the Guinea Coast. The Equator, the imaginary line which goes round the middle of the world, and is everywhere just the same distance from both the North Pole and the South Pole, divides Africa into a northern half and a southern half.

Now, you will see that there are some red bits on the throat of the rhinoceros, and that his whole nose is red, and a big red patch runs up north from his nose, which stops at some large lakes. Further north there is another red patch; and in some maps the top of the head behind the horn is marked red, too. This last bit is Egypt. Here, however, we shall not talk about Egypt, because it is not really a part of the empire, although the English control the government there at present, and are likely to go on doing so for some time to come. Now, until about a hundred years ago there

CONTINUED FROM 1720



would have been no red patches—nothing more than some little red marks on the Guinea Coast. Before that the Dutch had planted a colony at the Cape of Good Hope, which is the country we mean when we speak of "The Cape." But other European nations had taken possession of stations on the coast that they might trade with the natives and make an expedition now and then inland. It did not seem worth while to do more, because these places were hot and unhealthy; and people who tried to go inland found it hotter and more unhealthy. Besides, the natives were all savages with whom there was not much trading to be done. So that very little indeed was known about Africa—except Egypt and the countries which lie along the shores of the Mediterranean Sea.

But things are very different now, for during the second half of the nineteenth century many bold travelers, several of them Christian missionaries, made exploring expeditions, and did their best to make friends with the natives, as we have read in the part of our book beginning on page 297. And so it was found out that if Europeans set about the business in the right way some good might be got out of Africa after all. Therefore, the nations of Europe made agreements together that, instead of fighting one another

to get the biggest share, each should have a settled portion, which is called a Sphere of Influence, in which it might do pretty much what it liked as long as it did not interfere in the sphere of influence of someone else, and did not break certain rules which everyone feels to be just and necessary in the treatment of the natives.

THE THREE GREAT PARTS OF AFRICA THAT BELONG TO THE BRITISH EMPIRE

So there are three divisions of those parts of Africa which belong to the British Empire. First, there are the little portions on the Guinea Coast, which have been British for a long time, but have had more territory added to them. Then there is the nose, in the south, where there are a great many white people; and, thirdly, there are the lands in the interior which are in the British sphere of influence, where there are not many white people yet, and perhaps never will be—at any rate, until some way can be found of preventing them from getting diseases which are much more fatal to Europeans than to races which have lived in tropical climates for hundreds or thousands of years. But they have been there only a very short time as yet, so that they may still find out ways of making it more possible to go on living there.

Africa is so big, and there is still so much of it where only a very few white men have ever been, that explorers still go on finding new sorts of animals; and people who like adventures go there to hunt "big game," which means big beasts that are dangerous.

THE ANIMALS THAT ROAM WILD AND FIERCE IN ALL PARTS OF AFRICA

It was not long ago that a Frenchman named Du Chaillu was laughed at for saying there were huge apes very much stronger than men; but when a few more people went where he had been, they found that Du Chaillu had told the truth about gorillas after all. There are lions, too; and in some places they are so fierce that a few years ago, when a railway was being made in the middle of Africa, two lions came and killed so many of the people at work, as well as cattle, that the railway building had to be stopped until hunters could track those lions down and put an end to them. There are other big and savage kinds of apes, called baboons, which

live in herds; and rhinoceroses and elephants, which are not tamed for the service of man as they are in India, but are hunted for the sake of their tusks; and fierce, wild cattle, tall giraffes, and ever so many different kinds of beautiful antelopes. Besides these, there are the biggest of all birds, the ostriches, which do not fly at all, but run very fast; and the Europeans have made a business of bringing them together, and keeping what are called ostrich farms to breed them, much as we breed sheep and cattle. They are kept just as we keep them in California, for the sake of their beautiful feathers, which are plucked with no more hurt to the birds than the shearing of wool gives to sheep.

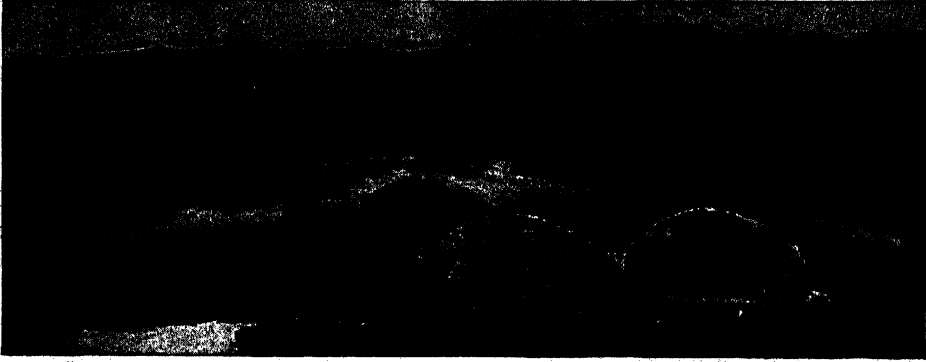
In all the British part of Africa, most of the natives are negroes with very black skins and woolly hair. In former times there was one kind of trade that was usually profitable, and that was the trade in negro slaves. People persuaded themselves that negroes had been sent into the world to be the slaves of white people, and that there was nothing wrong in carrying them off from their own country and selling them in other parts of the world.

THE MANY BLACK RACES THAT HAVE THEIR HOME IN AFRICA

In that way a great number of them were brought to America. There are a great many negroes in America now; many of those who are old were slaves themselves when they were children, and the rest are the children or grandchildren of slaves, whose ancestors had been captured on the Guinea Coast and taken away across the sea. The slave traffic was carried on by Englishmen, and the slaves were brought here in English ships, but it was the English who first woke up to the wickedness of it, and not only stopped the trade themselves, but persuaded other countries to stop it too.

Now most of Africa is inhabited by these negro races. Some of them are very warlike, but others are not particularly fond of fighting. Two of the most warlike are the Zulus and the Matabele, who really come from one stock; and some others who are called Basutos are related to them. All these live in the southern part, in Rhodesia, or in Zululand, or Natal, or the part of Cape Colony next to Natal. There are other warlike

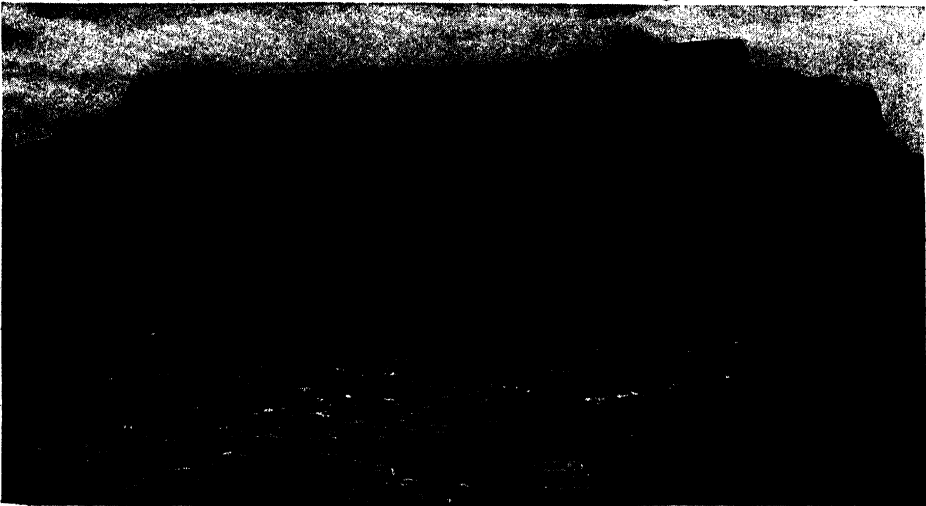
THE KRAALS AND CITIES OF SOUTH AFRICA



The three mud huts covered with grass in this picture are native houses of the Kaffirs in the wilder country. There are usually a number built together, forming what is called a kraal. Every native chief has several wives, and each wife owns one of these huts. We see here the enclosure where the cattle are kept fenced in.



This is the market square of the great town of Johannesburg, centre of the mining district in the Transvaal. To this square, the largest in South Africa, the Boers bring their bullock-wagons laden with farm produce.



This is Cape Town, nestling on the seashore beneath Table Mountain. The town was built by the Dutch, but the King of Holland sold it to the English. It is of great value on account of its magnificent harbor.

negroes, such as the Ashantees, who live near the Guinea Coast. But quite in the south and south-west there are other people who are not negroes, but have much lighter-colored skins, and are called Hottentots; and others—called Bushmen, or Bosjesmen, as the Dutch call them—are lighter still, and are also very small, whereas the Zulus and Kaffirs are often very tall.

HOW THE AFRICANS LIVE AND WHAT THEY BELIEVE

These African races are not like the people of India, who have been civilized for thousands of years, though their civilization is different from ours. The Africans have hardly been civilized at all; they have not tried to make themselves skilful in anything except things that have to do with fighting and hunting. They never thought of building themselves anything better than what we should call huts, or of making any but the roughest kind of tools, and even now they have learned little from the Europeans. In those parts of the country where they have a good deal to do with Europeans, many of them have been taught Christianity; but most of them are still heathen, and believe more in what we should call witchcraft or magic than in anything else; and even now, where there are no Europeans to stop them, some of them are cannibals.

THE PEOPLE WHO HAVE GONE TO AFRICA FROM OTHER LANDS

It is only in the south, where the climate is temperate and the air is wholesome, that there are plenty of Europeans, and large towns and farms; and even there we do not see much of the kind of manufacturing industries which we have in America. But while we have many different kinds of mines, in Africa there are gold-mines and diamond-fields, the discovery of which began about the middle of last century. And that discovery drew a great many more Europeans than before into South Africa. And besides Europeans, the gold-mines some years ago brought in a number of people of quite another race, the Chinese, because people thought they would be more satisfactory as laborers in the mines than either Europeans or negroes. But there are other people who do not want the Chinese at all, and as most of them have returned

to their own country they really do not count as part of the African population.

On the Gold Coast there are always a few white people, and some troops who are like the Sepoys in India, except that they are black instead of brown, under the command of white officers; and there are a good many natives who have learned to live in a civilized way. Along other parts of that coast there are French or German territories too, which are very much like the English.

But much the most important part is the southern region, which is now a union or dominion, where there are hundreds of thousands of white people, all under the British flag, governing themselves like the other great dominions of Canada and Australia. There are large towns, such as Cape Town and Durban and Johannesburg and Pretoria and Bloemfontein and several others.

THE WHITE COLONIES OF SOUTH AFRICA AND HOW THE DUTCH CAME THERE

The Union which is known as the Union of South Africa is made up of four provinces: the Cape of Good Hope on the south, Natal on the east coast, the Orange Free State north of the Cape of Good Hope and east of Natal, and the Transvaal, which lies northward across the Vaal River; but is divided from the sea by Portuguese territory. Bechuanaland west of the Orange Free State and the Transvaal, Rhodesia north of the Transvaal, and two small territories called Swaziland and Basutoland are also British possessions.

The Portuguese were the first Europeans to discover South Africa. Bartholomew Diaz sailed round the Cape of Good Hope in 1488, the year that Columbus sent his brother to England to ask for aid from Henry VII., and in 1497, the year that John Cabot discovered Newfoundland, Vasco di Gama sailed into Table Bay. An English fleet paid a visit to Table Bay and took possession of it the same year that the Pilgrim Fathers landed on Plymouth Rock, but no attempt was made to colonize the country by any nation until 1652, when the Dutch built a fort which made the beginning of Cape Town. The sailors from a ship that had been wrecked in Table Bay had brought home so good a report that the Dutch East

THE BRITISH EMPIRE IN AFRICA

India Company thought it was a good place for their ships to stop and break the long voyage to and from the East Indies. Gradually the little settlement grew larger, and about a hundred and twenty-five years later it was joined by a few hundred French Huguenots.

The colony was under the rule of the Dutch East India Company, whose government was tyrannical. The Boers, as the Dutch farmers were called, had very little freedom, and in an effort to escape from, what would seem to us, the oppression of their governors, many of them "trekked" outside the bounds of the settlement. When the Napoleonic wars broke out, Holland, as we have learned, fell under his rule. As England was at war with Napoleon, the British ships attacked Cape Town and took possession of it. But this was done in the name of the Prince of Orange as the ruler of Holland was then called, and when peace was made the colony was given back to Holland. A few years after war again broke out with Holland on the side of France, and the colony was again taken by the British. This time they kept it; but paid Holland a large sum of money just as the United States paid for the Phillipine Islands after the Spanish war. At this time the Cape of Good Hope had not half so great an area as the province has now, and there were only 27,000 white people scattered through it.

HOW THE TRANSVAAL AND ORANGE FREE STATE WERE FOUNDED

The new government was much fairer and better than the rule to which they had been accustomed, but many of the Boers did not like the change, and when, about twenty years later, slavery was abolished in all British possessions, they liked it still less. They believed they had the right to keep the natives in slavery, and as most of the Boers were farmers who had large herds of cattle, they did not see how they could do without their Hottentot slaves. They felt, too, that the sums of money allowed to them for freeing the slaves was not sufficient. Beside all this, their treatment of the natives, especially of the Kaffirs who fought against them and stole their cattle, was harsh, and they did not like rules that were made to compel them to be more kindly. Because of all these grievances, some of the Boers again began

to trek, and in all about four thousand left Cape Colony with their wives and children, their flocks and herds. Some of them stopped in the country beyond the Orange River, and others went on until they crossed the Vaal River, and this was the origin of the Orange Free State and the Transvaal.

When the Matabele, who were great warriors, and had conquered that country, attacked them, they defeated them; and the Matabele fled, leaving the Boers to form two republics in peace. Afterwards these two Boer Republics came to be called the Orange Free State and the Transvaal. The going away of these Boers out of Cape Colony is known as the Great Trek.

The second British colony, Natal, was founded partly because of the Great Trek. For in those days most of that part of the country was ruled over by a Zulu king called Dingan. The Zulus, like the Matabele, were great warriors, who conquered the more peaceful tribes and forced them to do their bidding. But when the Boers had gone up into their new lands, they still wanted to be able to reach the sea, so some of them crossed the Drakensberg Mountains, and sent a few of their number to ask Dingan to permit them to settle in his country.

HOW THE BOERS WERE BETRAYED AND HOW THEY TRIUMPHED ON DINGAN'S DAY

Dingan received them in a friendly way, but just as the envoys were leaving he had them murdered, and then sent off his warriors to destroy the rest of the Boers who had crossed the Drakensberg. Most of the Boers got warning in time, and made what is called a laager by drawing their wagons together round their camps so that they could shoot from behind the wagons. Many of them were killed, but reinforcements reached them, and when the Zulus came the Boers won a great victory, which is remembered as "Dingan's Day." After that the Zulus had a new king named Panda, who was more friendly. When the Boers had settled themselves they began to ill-treat some of the Kaffir tribes; and then the Government at Cape Colony said that, after all, the Boers were British subjects, though they were not living in British territory, and could not object to the British setting up their own government

there—which they did. But the Boers did not want to be under British government; they went back over the Drakensberg, and left Natal to the British.

THE BRITISH, THE BOERS, AND THE NATIVE TRIBES

Now, the British did not want to be troubled with the two Boer States which had been set up beyond the Orange River and the Vaal River. The Boers in the Orange Free State had a great deal of trouble with the chief of some native tribes called the Basutos; and at last the British arranged terms between the Boers and the Basutos, and said that the Basutos must obey the British. The Boers were to govern themselves in the Orange Free State, but were still to recognize that the British had a right to interfere whenever they thought that interference was necessary. Very much the same thing happened in the Transvaal.

A few years after this diamonds were discovered, and made the land in which they were found valuable. This land was chiefly inhabited by Griquas, a people who were of part white and part Kaffir descent. The Orange Free State claimed the territory, and a dispute arose which was only ended when the British government took over the land and paid the Orange Free State \$450,000 for any claim that it might have. It was about the same time that the British began to push up through Bechuanaland, and on into the Matabele country beyond the Transvaal. This was done under the influence of Mr. Cecil Rhodes, a young Englishman who had begun to dream of a British Empire in South Africa, and of a great railway that should join the north and the south. That is why so much of the country was given his name—Rhodesia.

HOW BRITISH POWER BEGAN IN THE BOER REPUBLICS

But before Cecil Rhodes had set to work, when the English had just taken possession of the diamond-fields in the south of Bechuanaland, some important events happened. The Boers in the Transvaal were not so prosperous or so well governed as those in the Orange Free State, and they had serious quarrels with the Zulu king, Cetewayo, who ruled north of Natal. Cetewayo appeared to care so little about the whites, and the Transvaal seemed so little able to defend itself, that the British sent

an army, and declared the Transvaal British territory.

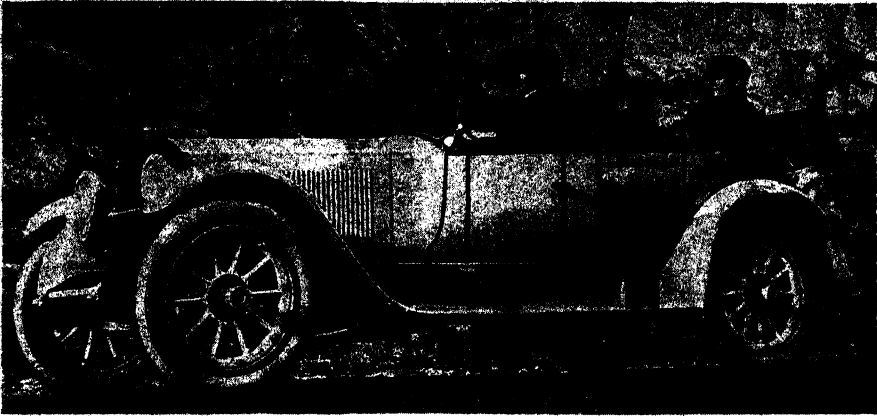
But then the Boers in the Transvaal resolved that they would not have a British Government, and they took up arms, and won a victory over the British at Majuba Hill. Then there were so many people in England who said that, after all, the Boers were in the right, and had done exactly as they would have done in their place, that the British gave them back the Transvaal, and allowed them to establish their Republic again; but they did not make the Boers see that this was done because they thought it was just, and the Boers grew to think that it was done because the British were defeated and were afraid. And later on very great trouble came out of that.

THE UNION BETWEEN BRITONS AND BOERS THAT FOLLOWED ON THE WAR

Gold-mines were found in the Transvaal, and a great many British subjects went there to get gold out of the mines. But the President, Paul Krüger, said that the "Uitlanders," as they were called, must pay heavy taxes, and the Uitlanders said that, if they did, they ought to have a share in the government, which the Boers would not allow them. And as President Krüger was using the money he got to buy guns and instruments of war, people began to think that he really intended to make the Boers master of all South Africa. So a great war arose in 1899, and went on for nearly three years.

Now, that war had made it clear that there would never be any certainty of peace in South Africa if there were two independent Boer States in the middle of the British dominions; and the Free State and the Transvaal were made parts of the British Empire. But because the British believe that people who are so nearly akin to themselves can never be ruled over as subjects, they resolved that they should have just the same rights as Englishmen or Scots, when once the country had been brought into order after the war. And just as England and Scotland became a united nation, and English and Scots a united people, after they had been fighting each other for centuries, so in 1910, the four states, two British, two Boer, were joined in the Union of South Africa.

THE NEXT STORY OF COUNTRIES BEGINS ON PAGE



WHAT MAKES A MOTOR-CAR GO?

THE mystery of the motor-car is a mystery that has only lately dawned upon millions of people, but it is, of course, only the old question of using natural forces for power. In nearly all motor-cars it is a gas that makes them move. In one way or another this gas is made in the engine of the motor-car or is sent into it, and, as this gas is made under pressure, its atoms fly about in all directions, and so press upon that part of the engine which is connected with the wheels. In most motor-cars gasoline is burned with air, which is admitted to the inside of the engine, and the gases which are produced by this burning make the motor-car move. Gasoline is really a vegetable product and has in it the power which poured upon the earth from the sun ages ago. It is really the sun, then, that makes the motor-car move; not the sunlight of to-day, but the stored-up sunlight of long ages ago.

In steam motor-cars the power is produced as it is in a railway engine or a steamboat. Something is burned—it is generally gasoline—and so boils water, and it is the water-vapor or gas that acts on the engine in this case, just as the gases made by the burning of the gasoline act upon the engine in the commoner

CONTINUED FROM 1656



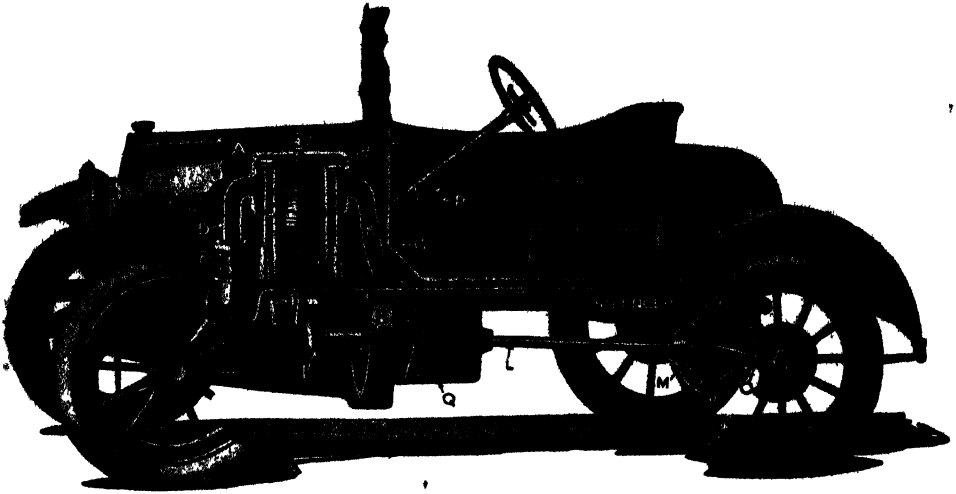
kind of motor-cars. Electricity is used in ordinary motor-cars to set the gasoline burning. Each time the spark passes, a little dose of gasoline is burned, and it is this burning of gasoline that makes the noise that we hear, or part of it.

Other cars which are driven directly by electricity move more quietly than those driven by gasoline or steam.

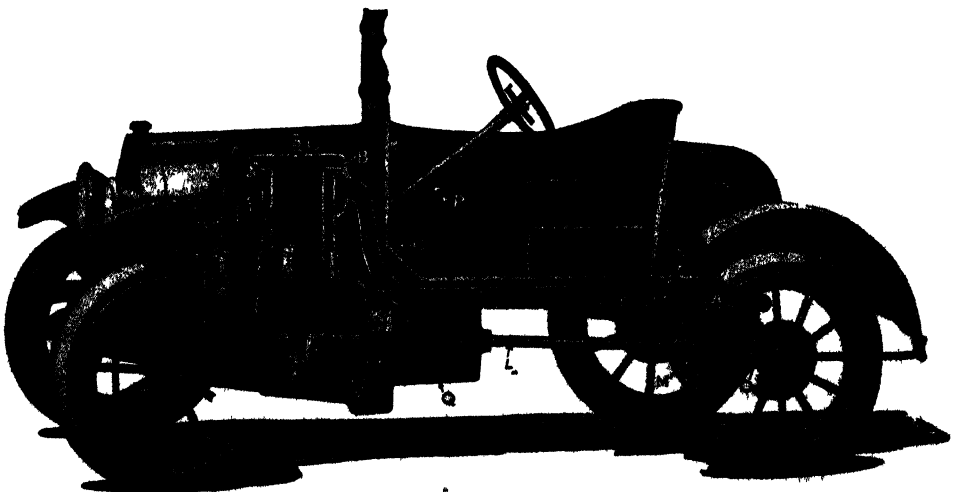
HOW BIG IS SPACE?

Well, how big is this question? said the Wise Man. Men have been thinking about it ever since men began to think. If we think about it for ourselves, we shall see that it is impossible to think of space as anything but infinite—something going on for ever. For suppose that with a telescope we could pierce right through space until we came to a great wall, and that was the end of space; yet on the other side of that wall there must be more space, however far away the wall was, and if there were another wall beyond it, there would be more space beyond that. It is impossible to think of space as anything that stops. If there were a boundary no further away than the wall of your room, or a boundary so far away that even light would take a billion years to reach it, in either case we cannot

WHAT MAKES A MOTOR CAR GO



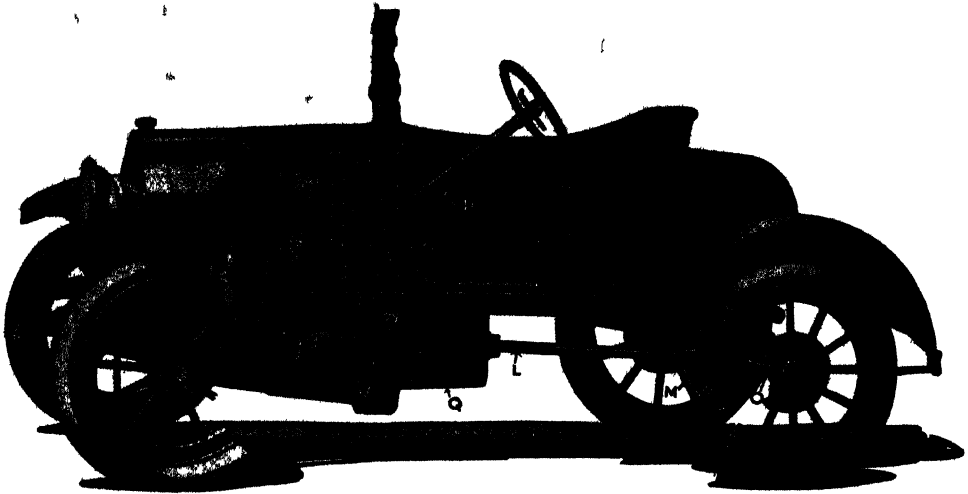
The works of a motor car seem hopelessly puzzling, but the machinery which makes it go is really very simple. Here is a car with part of the side broken away. A regular motor car has four, six, eight, or even more, cylinders in its engine, but we show only one for the sake of clearness. A motor boat or a motor cycle works in the same way. The inlet valve A is open ready for the gas to rush in; B is the exhaust valve through which the used up gas is forced out; C is the sparking plug with a wire running to the batteries under the seat, D is the inlet pipe through which a mixture of air and gasoline vapor passes; E is the piston, which slides up and down in the cylinder and is connected by the piston rod J to the crankshaft I. The cylinder is shown here much enlarged, and the cooling arrangement is omitted.



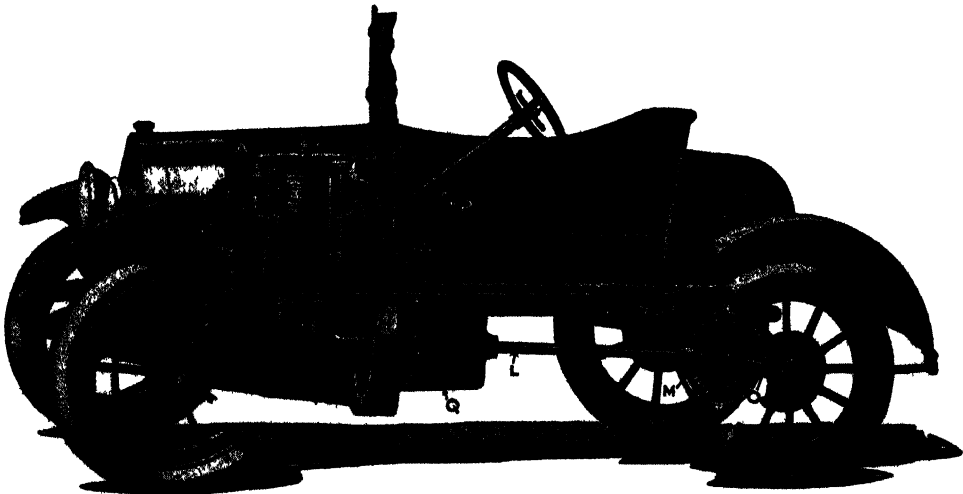
Now let us see what happens when the crank in front of a car is turned, or the button G of the electric starter is pushed. Either of these things makes the flywheel H turn, which pulls the piston E to the bottom of the cylinder, creating a vacuum. Gasoline from the tank back of the seat in passing through the carburetor F is broken up into a fine spray and mixed with air. This mixture, which is a very explosive gas, rushes through the pipe D and the valve A and fills the cylinder. When the piston E reaches the bottom both inlet and outlet valves are closed, and the flywheel as it continues to revolve pushes up the piston and compresses the gas which has been drawn into the cylinder into a much smaller space.

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WHAT MAKES A MOTOR CAR GO



When the piston E has reached the top and the gas has been compressed into a very small space, the sparking plug C at the top of the cylinder is arranged to give off a spark. The compressed mixture of gasoline vapor and air instantly explodes and drives down the piston with tremendous force. This explosion furnishes the energy to move the car. The same thing is going on in the other three, five, or more cylinders of the car, but the explosions are arranged to take place at different times, so that the flywheel turns smoothly and continuously. The piston rod which is connected with the crankshaft makes the flywheel spin around swiftly, and as it turns it pushes the piston up again. Without the flywheel the piston might stop at the bottom of the cylinder after the first explosion, and the engine would stop.



As the piston starts upward again after the explosion the outlet valve opens and the used up gas is forced out through the exhaust pipe K. The silencer or muffler destroys much of the noise of the explosion. This used up gas causes the odor you get after a car has passed. The flywheel continues to turn and the piston starts down again and draws more gas into the cylinder, ready for another explosion. The flywheel and the crankshaft can run without moving the car, or can be connected with the shaft L in the transmission box Q. The shaft L by means of cogwheels M and N turns the rear axle O, and makes the car move. Whether the car stands still while the engine runs, goes backward or moves forward at low, intermediate, or high speed is governed by the lever P which you see in the body of the car.

think that there is nothing beyond the boundary; there must be more space. We often say that one telescope has so much space-penetrating power, that another has three times as much power, and so on. Yet, if we could make another telescope with such space-penetrating power—which really means the power to let us see light coming from such a great distance—that the biggest telescope we have, compared with it, would only let us see as far as a worm could see, that telescope would be no nearer bringing us to the end of space than the sight of the worm is. If a thing is infinite, you are no nearer the end of it than you were before, however far and fast you go. A great man has said that this idea of infinite space sometimes impressed his mind so much that he dared not think of it. Yet there is in it nothing to make us afraid, but only to make us thoughtful.

HOW BIG IS THE WORLD OF STARS?

This is an utterly different question from the last one. Knowing that space must be infinite, men used to think that the world of stars must also be infinite, that however far we went through space we should still find more and more stars. But many men now think that this is not so. It seems to be the case that when we examine the world of stars—our universe, as we may call it—with the telescope, we find that after a time the stars become thinner and fewer, and that in many parts of the sky we can, so to speak, see right through them, and see nothing beyond. Thus, it is probable that our universe of stars—of which our sun is one—is not infinite, but has a limit. There may be any number of other universes like it or unlike it. There is no limit to space, and there is no limit to the power of God.

But our universe, or world of stars, big though it be, probably has a limit, just as the solar system has a limit. The size of it has even been guessed at, and it has been said that the distance across is perhaps the distance that light would travel across in thirty thousand years. If you like to measure the number of miles for yourself you can; but I fancy it would take most of this page to print it. When they speak of these great distances, astronomers do not speak of miles, for miles are too small to count with. They take

the distance that light would travel across in a year—you know that it travels 186,000 miles in a second—and they call that distance "a light year." Perhaps the universe is 30,000 "light years" across. If you have a big enough piece of paper, here is your chance for a problem!

WHICH TRAVELS QUICKER—HEAT OR COLD?

One of the wisest men who ever lived, Francis Bacon, said that the business of knowledge is often not so much to answer questions as to know what questions to ask and how to ask them. The great business for us, he said, is "rightly to put the question to Nature." This deserves a place among the wisest things that have ever been said. It is just when we learn how to ask a question that we gain more knowledge, and that is equally true, whether we can answer the question or not. Often men have learned great things simply because someone has said "you cannot ask that," of a question which men have been asking for hundreds of years.

Now, this question is one which we cannot ask, for there is no such thing as cold. Complete cold, if we could get it, would only be complete absence of heat; and what we ordinarily call cold is simply less heat than in something else with which we are comparing it. When a thing gets cold, it really gets less hot. So we cannot speak of cold traveling, unless we mean that it is a cold wind that is traveling, or cold water traveling through hot water, as when you run cold water into a hot bath. But we can say how fast heat travels, if by that we mean the rays of heat or radiant heat that we feel near a fire or a light. This kind of heat is really the same as light, and it travels at exactly the same speed, which you know. But cold travels at no speed, for there is no such thing.

WHY HAS EVERY CLOUD A SILVER LINING?

The reason is simply that at its edge the cloud is thinner, and much more light can get through it, and that gives it its silver lining. Some clouds, however, are very thin, just like a sheet of tissue-paper in the sky, and we can scarcely notice a silver lining to them. Of course, if we went up in a balloon, above an ordinary cloud which seemed

to have a silver lining to us when we were on the earth, we should see the whole cloud bright because the sun would be shining upon it, and it would throw back or reflect the sun's light to our eyes. This is true of the darkest and blackest clouds all through the day-time. The sun is always shining, and the darkest cloud has a bright side.

The trouble for us is that we see the dark side, but we ought to know and remember that the bright side is there. Of course, as we see, all this may have a meaning that applies to the troubles of life, big and little. That is why people remind us that every cloud has a silver lining. But it is even better than that, for every cloud has a silver side just as bright as the other is dark. I think some people's minds are always like our eyes in a balloon. They seem to see every cloud on its silver lighted side. These are the kind of people that it is good to live with.

WHY DOES WATER QUENCH FIRE, IF ITS PARTS, OXYGEN AND HYDROGEN, MAKE FIRE?

The first part of the answer is that as the oxygen and hydrogen of water are already burnt up with each other, they can be burnt up no more. If you first of all separated the oxygen and hydrogen, and added the unburnt mixture of them to the fire, then there would be no doubt that they supported combustion, though there would not be much of you left to remember it; and if I thought that you had any chance of making this dangerous experiment, I would not mention it.

The second part of the answer is that water puts out fire for two good reasons. The reason that everyone can understand is that, if a thing is covered with water, the oxygen of the air cannot get at it to burn it. But that is not nearly the most important reason why water puts out fire. It is that water has a great capacity for heat, and can hold a great deal of it. It takes so much heat into itself, and so quickly, that it lowers the temperature of the burning thing so that it can no longer burn.

WHY DOES A VIOLIN GIVE A HIGHER NOTE WHEN THE STRINGS ARE PRESSED DOWN?

The shorter a string is the more quickly does it vibrate or tremble when it is plucked or when a bow is rubbed

across it. When you put your finger on a violin string or "stop" it, this comes to the same thing as making the string shorter, and then, when the string is set vibrating, it must vibrate more quickly. But one note is higher than another just because the air is trembling more quickly to make it.

If you stop the string just half-way along its length, it will give out a note exactly an octave higher than it did before—a high G instead of a low G, for instance. This is because the string now vibrates exactly twice as fast as it did before it was stopped, and the note that is made when the air vibrates twice as fast as it did before is exactly an octave higher. If, now, you halve the string, you will get the G an octave higher still. If you tie one end of a piece of string and hold the other at different distances along it, you will get just the same result as when a violin string is stopped. The wonderful thing is how little pressure it requires on the string to produce the effect of shortening it, and so getting a higher note. More wonderful still is the skill of the player who can learn to move his fingers along so as to get exactly the notes that he wants.

DOES LIGHT WEIGH ANYTHING?

Sometimes I really cannot help saying "What a good question!" said the Wise Man. If light were made of a shower of little sparks or specks, as Newton thought, then each of those must weigh something. Light, however, we know, is not matter at all, but a wave in the ether. So it has no weight. But that is not the whole story. Our study of light teaches us that it ought to have the power of pressure, which, *in its results*, comes to the same thing as weight. Thus, if you have a balance, and equal weights on each side, and then make a beam of light play down on one side, it ought to press down that side of the balance, just as if a weight had been added.

This is what was taught by a great Scotsman, Clerk-Maxwell, many years ago, before this pressure of light had been proved. He was so clever that he foretold not only that there must be such pressure, but how much it must be. We can now show that pressure by experiment, and have found that his prediction of its amount—though he

had never seen it at all—was right. It is possible to prepare what is really a balance delicately hung on a thread of quartz, and to see that when a ray of light plays on one side of it, at once the balance turns as if you had touched it with your finger, or thrown something against it. This pressure, which is so like weight in its results, though it is not weight, is sometimes called light pressure. But it is common not only to the light that we can see, but also to the other radiations or rays in the ether which our eyes are not made so as to see. The proper name for it, therefore, by which it is now known everywhere, is not light pressure, but radiation pressure.

WHY DO ANIMALS IN SNOWY COUNTRIES WEAR WHITE COATS?

The use of the white coat is to protect the animal from its enemies by making it difficult to see. If the animal keeps still it can scarcely be seen at all when its coat is the same color as the snow. But if it had a white coat in summer, when the snow goes, it would be easily seen, and so often its coat changes in summer, and the fur takes other tints, more like the color of the ground and the plants among which it lives. This is called *protective coloring*, and is very useful to many animals, as we can understand from the pictures on page 3444. But sometimes it happens that an animal which lives by catching others is also white in winter snow, so that it can get near its prey without being seen. Some insects also change coloring, and when they sit quietly among the leaves of certain plants no one can tell which is insect and which is leaf, so the birds that would eat them up cannot find them.

WHY DOES SILVER TARNISH AND GOLD NOT?

There is always a good deal of sulphur in the air in one form or another, and this sulphur acts upon a good many things that may be exposed to the air. Especially we notice this where we burn gas, as that adds a good deal of sulphur to the air. No sulphur compound has any action upon gold, so gold does not tarnish. But several sulphur compounds act upon silver, covering the surface of it with a film of what is called silver sulphide, which is black. When we brighten silver, we rub this sulphide away; but of course this means that we are slowly losing the silver itself, and in

time we shall notice the loss. Often people wear silver bangles or other silver ornaments next the skin. If it happens that such a person is taking sulphur as a medicine, he or she may notice that the bangle, or whatever it is, turns black. This is because some of the sulphur leaves the body through the skin, and so tarnishes the bangle by forming a film of silver sulphide on it.

WHAT IS IT THAT CAUSES RUST?

In the answer to the last question we learned that sulphur compounds act on silver but not on gold. The oxygen of the air acts neither upon silver nor gold, which, as we know, is the reason why they are called the noble metals; but it does act upon iron, especially when water is present. Somehow the water helps the oxygen of the air to attack the iron. When the surface of the iron is burnt or oxidised, it forms an iron oxide, and that we call rust. So iron is not a "noble metal."

But if we think further, we shall see that just because iron can rust it is the most noble and valuable metal in the world. If iron were like gold and silver and could not be oxidised, or rusted, we should not exist on the earth, nor would any green plant. It is rusted, or oxidised, iron that gives all the color to the good brown earth as well as to colored jewels, like rubies; and it is this rust which is dissolved by water, and so forms food for the plant, and gives it its green color. It is this rust also by which we get iron into our blood, and which gives it its red color.

So the life of the earth is due to rust as well as the color of the earth. We think rust a nuisance because it spoils our knives; and our forefathers would not call iron a noble metal because it was liable to rust. But we know that because iron can rust, because it can be acted upon by the air, it is the noblest metal in the world. John Ruskin says that the iron breathes the air, and so gives life to all of us, and that is a beautiful way of putting it.

WHAT BRINGS LIFE OUT OF DRIED SEEDS?

We may be sure that the life is there, or it would not come out of the seeds. The seeds are the children of plants that were alive before them, and part of their parents' life is in them. But it is quite true that a dried seed is very

different from one which is sprouting, and it is fair to say that its life is resting or passive or suspended for the time. It is alive, we know very well, for it can be killed by boiling it or by a poison or in many other ways, and a dried seed may be dead or alive, as an egg may be dead or alive.

You will never be able to get a chicken out of a dead egg, or a plant out of a dead seed, but you will get a dried seed—provided it has not been killed—to sprout if you add water to it. It is because it is dried that it seems to stop living, which is not the same thing as to die. We know that it is not the same thing, for when it gets water it shows us that it is not dead. The chemical changes which are necessary for all active life must have water, if they are to go on. The water does not make the life come out of the dried seed, but reveals it. If you have injected a drop of prussic acid into the seed first, then the water will fail to make it sprout, for it is killed.

WILL SEEDS GROW AFTER BEING KEPT HUNDREDS OF YEARS?

This is a very simple-looking question, to which the answer ought to be yes or no, and I think, said the Wise Man, that the answer is no; but it is really very difficult to be sure about it. People say that they find grains of wheat buried with an Egyptian mummy that must have been lying there for thousands of years, and that these grains of wheat, when given water, will sprout. Then other people say that, as a matter of fact, there has been some mistake, and that these grains have somehow got in quite lately, or that there has been some fraud practised on the trustful traveler.

Some such explanation as this seems to be likely; but we simply do not know what the truth is. We might set some experiments going now which would be very interesting and valuable hundreds of years after we have gone. Only very few people will take the trouble to start an experiment unless they are to see the end of it. We know that a dried seed need not be a dead seed, but we do not know what is going on in that seed; we do not know to what extent it is breathing or taking in tiny quantities of water-gas from the air; we do not know to what extent this is necessary if the seed is to keep alive. In fact, this is one of the interesting

questions that we have failed to study sufficiently yet. The importance of it is enormous, because, for instance, it might be that if seeds could keep alive for many years they might be carried through space from the world where they were born, and be planted upon another world. This has actually been suggested by such a great man as Lord Kelvin.

WHY ARE SOME PLANTS ALWAYS GREEN?

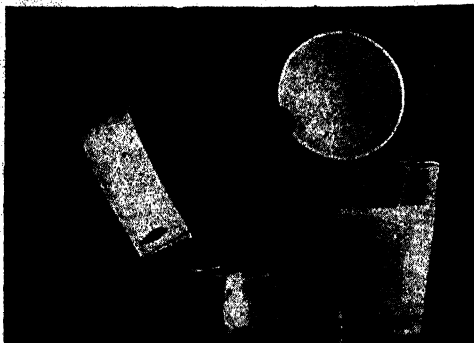
Though it is the common rule that green plants lose their leaves in the winter, when there is less sun for them to use, yet we must remember that the variety of life is infinite, and that one plant has one way of living which suits it, and another has another. Thus, some plants, which we call evergreen, develop a strong kind of leaf which lasts all through the winter, in spite of the wind and the wet, and use the winter sun whenever it shines. Probably we shall find, at any rate in some of these cases, that the plant really belongs to a part of the world where there is plenty of sun in the winter, so that it is quite worth the plant's while to keep its green leaves all the year round. We must not think that evergreen plants are necessarily better than those whose leaves fall in the winter, for we know that the change and the fall of the leaf is not really a process of decay or of death, but a living process, meant to serve the life of the plant as well as can be.

HOW DOES A SOAP-BUBBLE HOLD TOGETHER?

The soap-bubble is really a bubble of water—the soap merely helps—and the water is liquid water; but, as the bubble is made, the water is spread out into a sort of skin, and for a time, at any rate, that skin holds together because the particles of which the water is made hold on to each other and avoid the air on both sides of them. Of course, the bubble cannot last long, for the water which makes it runs down by the force of the earth's attraction until it becomes too thin, and then it bursts.

The point for us to remember just now is that the soap-bubble, like tea and sugar, and balls of mercury, and water and blotting-paper—that all these are really questions of the ways in which the surfaces of things behave when they are next to surfaces of something else. These are all really

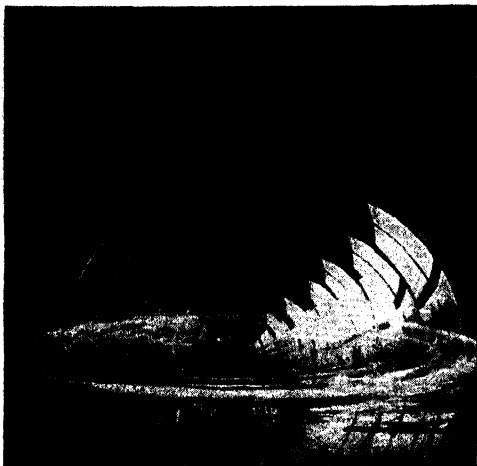
WHAT TO DO WITH SOAP-BUBBLES



Beautiful results can be obtained from soap-bubbles. We must first make a strong lather by rubbing a piece of yellow soap in water, skim off the mass of suds from the surface, and pour the solution into a tumbler as shown. The solution must not be stirred.



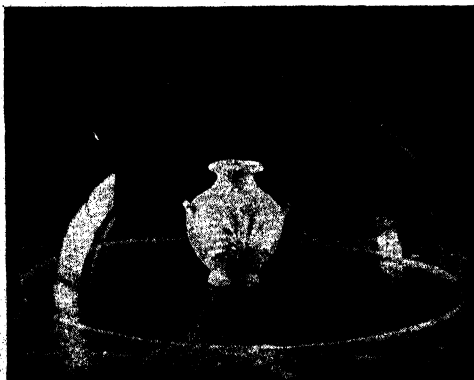
Next we should smear a little of the solution upon a sheet of glass, and blow a bubble through a straw. Then, dipping our finger into the solution, we must put it right through the side of the bubble. If we can do this without bursting it, the solution is ready.



It is now easy to blow a number of bubbles, one inside the other, on a sheet of glass, as shown in the picture. For each bubble the straw should be dipped right into the solution, for if any portion of the straw is dry, it will burst the bubbles when it touches them.



Now let us smear a glass, and an ordinary funnel, with solution, put the funnel over a little vase, and blow down the funnel, slightly raising it until a bubble is formed. Then placing a finger on top of funnel, we can turn it over until the bubble is free.



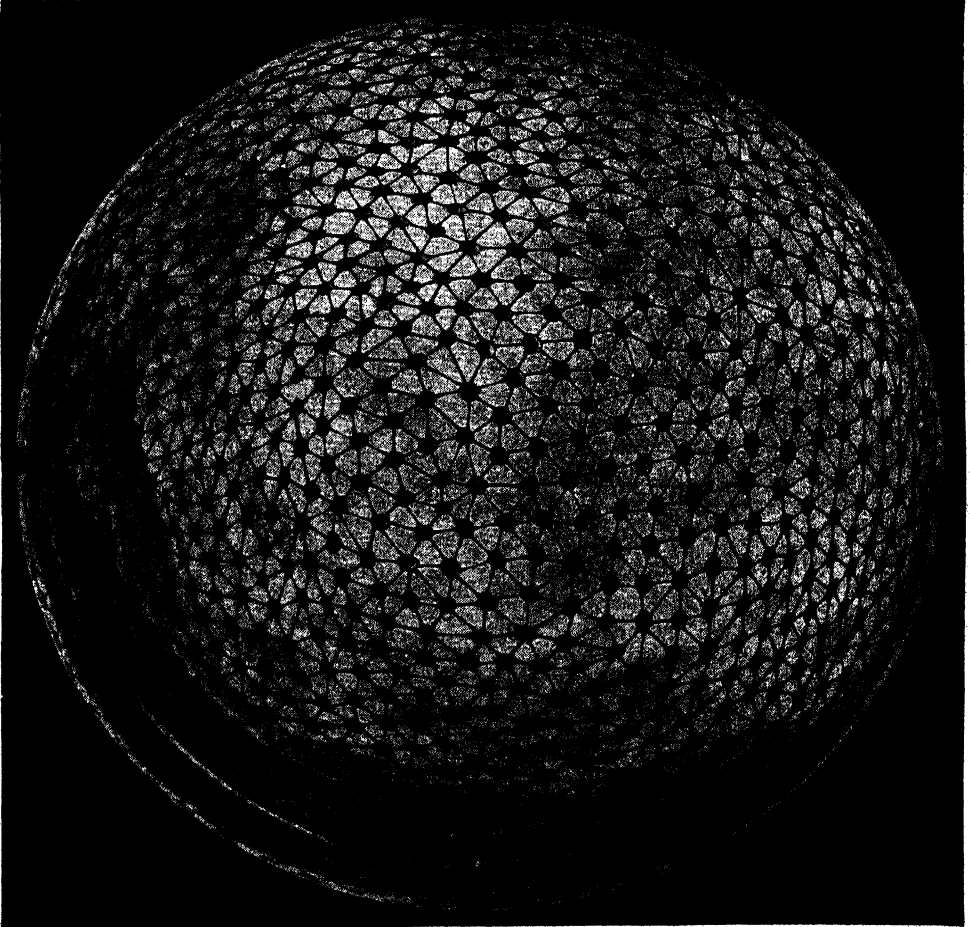
Here we see the result of the last action: this little vase is standing on a sheet of glass completely inside a bubble. Little model houses and toys can be placed inside a bubble by the funnel, in the same way.



We can make a bubble cling to a flower by first putting the flower in the solution, and then blowing a bubble through the straw on to it. Bubbles will cling to most objects that have been dipped in the solution.

questions of what men of science call *surface tension*. Tension simply means stretching, and so the name hints at the forces of stretching and holding, which are shown when the matter that makes up one surface meets another. These questions are very difficult. In

We should almost think of the soap-bubble as made of millions and millions of tiny little creatures, each with arms all around it, and all these arms holding on to the arms round them. On all sides, then, and equally in all directions, there is a pull. All the little creatures, so



THE WONDERFUL WAY IN WHICH A SOAP-BUBBLE IS MADE TO HOLD TOGETHER

This picture shows us how a soap-bubble holds together. There are millions of tiny molecules of water, like a wonderful net of beads, blown out into ball shape by the hot air inside. Of course, no microscope could show us a bubble like this, but the picture gives us an idea of how one is made. The molecules of water should be infinitely smaller and greater in number than here, and the lines between the molecules are merely drawn to suggest the way in which cohesion draws the molecules together. There are not really any lines.

the case of sugar, or the case of a tube, for instance, we have three surfaces to study—the tube; the air; and the water, tea, or mercury.

WHY ARE SOAP-BUBBLES ROUND?

Soap-bubbles are round for the same reason that so many other things are round. All the parts of the soap-bubble are pulling equally towards each other.

to speak, are the same size, and have the same number of arms, and pull with the same force, as suggested in the picture. Between them, they make a sort of thing like a mattress, in the shape of a ball, but all the parts of this mattress are pulling on to each other. If the pull is uniform, the ball must be round. Of course, other things are happening. The soap-bubble, we know, is made of

matter, for which the earth has an attraction, and which has an attraction for the earth. This pulls the soap-bubble out of shape, and so, if it were possible to measure a soap-bubble very carefully, I do not think you would ever find one that was perfectly round. But if a soap-bubble could be made somewhere where there was no outside force pulling, it would be quite round.

WHY DOES A SOAP-BUBBLE RISE AND FALL?

It is quite true that if a soap-bubble lasts long enough, and does not burst too soon, it will begin to come down again after a little. The simplest explanation of this would be to remember the case of a balloon filled with hot air. It goes up, for a time, and then it comes down again. It goes up because the hot air inside it is lighter than the air round it, and, being lighter, must rise, just as hydrogen would have to rise. When it cools, then the weight of the covering of the balloon brings it down again. Now, a soap-bubble is really a little hot-air balloon, for the air that fills it is warm air from our lungs, and the air is so much lighter than the air outside that it goes up with force enough to carry the weight of the water that makes the skin of the soap-bubble. But this cannot last long, for water is a very good conductor of heat, and the skin of a soap-bubble is very thin, and so the heat from our breath that is inside the soap-bubble soon escapes, and the bubble becomes as cool as the air around it. Then there is nothing to hold up the water of the bubble, and it begins to come down. It is interesting to know that the early experiments for ballooning were actually made with soap-bubbles.

WHAT CAUSES A LIGHT TO BE YELLOW?

What we call white light is made up of a vast number of lights of different colors all mixed together in just such a proportion that our eyes call it white. It is almost as if every note on the piano were played at once—with the difference that if this were done our ears would call the sound unpleasant; whereas, when our eyes see all these different kinds of light at once, the result is pleasant. The reason why it is pleasant is that this is the kind of light which the sun gives, and so through long ages our eyes have become suited to it. Now, yellow is just one of the colors that go to make up

white light. The waves that make it are quite well known, and are rather low down in the scale of color, like a low note on the piano; while blue, for instance, is high up in the scale, like a high note. Though we say that the sun gives white light, yet really there is rather too much yellow light in sunlight for the result to be quite white.

WHY ARE BIRDS' EGGS OF DIFFERENT COLORS?

We know, of course, that the differences in color depend upon the presence in the various shells of various coloring substances or pigments, and it is very interesting to see how a particular kind of bird always produces the same kind of color in its eggs, just as it produces a particular kind of color in its own feathers. I do not think that the particular kind of food the birds feed on, nor yet the particular surroundings it lives in, have much to do with the special color of its eggs. This must really depend upon the particular chemistry of the body of the bird. I do not mean that you cannot change the color of hens' eggs, for instance, by food, but you will never get a hen to lay a speckled green egg. The color of the shell is really as special to the particular bird as any of the things by which we know one bird from another.

WHAT USE ARE THE DIFFERENT COLORS OF BIRDS' EGGS?

If we compare the colorings and markings of a great number of birds' eggs with the places in which they are found, we discover that in a large number of cases the eggs are so like their surroundings that they are difficult to see at all unless we look quite closely. For instance, a ringed plover's egg has the same general coloring as the sand on which it lies, and it is spotted over with black dots which look like tiny shadows. This makes it difficult to see the egg at all. In other cases the blotches or markings on the eggs look like an irregular piece of dark material lying, perhaps, on the beach. Thus, the eggs of the tern sometimes look like stones or spotted pebbles, and, on the other hand, the stones themselves look so like eggs as to be easily mistaken for them at a slight distance; so that the reason for the coloring of eggs is no doubt to help them to be hidden from sight.

THE NEXT QUESTIONS BEGIN ON PAGE 1877.

The Book of POETRY

THE STORY OF A BOY'S HEROISM

HOLLAND is a land where the people have continually to keep watch on the sea, as parts of the country are below the level of the water when it is high tide. In order to keep the sea from flooding the land, great banks of sand and other material were built in these parts of the country. These banks, or dykes, as they are called,—in America a "dyke" is a ditch,—had to be kept in constant repair. This poem tells the true story of how, long ago, a little boy, during a stormy night, managed, by continually pressing up handfuls of sand and earth into a small breach made in one of the dykes, to prevent the sea from widening the breach and flooding the land behind. The writer of the poem was an American author named Phœbe Carey, who was born in Ohio, in the year 1824, and was for many years very popular in America.

THE LEAK IN THE DYKE

THE good dame looked
from her cottage
At the close of the
pleasant day,
And cheerily called to her little son
Outside the door at play :
"Come, Peter, come! I want to see
you go,
While there is light to see,
To the hut of the blind old man who lives
Across the dyke, for me ;
And take these cakes I made for him—
They are hot and smoking yet.
You have time enough to go and come
Before the sun is set."
Then the good wife turned to her labour,
Humming a simple song,
And thought of her husband working hard
At the sluices all day long ;
And set the turf a-blazing,
And brought the coarse black bread,
That he might find a fire at night,
And find the table spread.
And Peter left the brother
With whom all day he had played,
And the sister who had watched their sports
In the willow's tender shade ;
And told them they'd see him back before
They saw a star in sight,
Though he wouldn't be afraid to go
In the very blackest night !
For he was a brave, bright fellow,
With eye and conscience clear ;
He could do whatever a boy might do,
And he had not learned to fear.
Why, he wouldn't have robbed a bird's nest,
Nor brought a stork to harm,
Though never a law in Holland
Had stood to stay his arm !
And now, with his face all glowing,
And eyes as bright as the day
With the thoughts of his pleasant errand,
He trudged along the way.
And soon his joyous prattle
Made glad a lonesome place—
Alas ! if only the blind old man
Could have seen that happy face !
Yet he, somehow, caught the brightness
Which his voice and presence lent ;
And he felt the sunshine come and go
As Peter came and went.

CONTINUED FROM 1582



And now, as the day was
sinking,
And the winds began to
rise,
The mother looked from her door again,
Shading her anxious eyes ;
And saw the shadows deepen,
And birds to their homes come back ;
And never a sign of Peter
Along the level track.
But she said : " He will come at morning,
So I need not fret or grieve—
Though it isn't like my boy at all
To stay without my leave."
But where was the child delaying ?
On the homeward way was he,
And across the dyke while the sun was up
An hour above the sea.
He was stooping now to gather flowers,
Now listening to the sound,
As the angry waters dashed themselves
Against their narrow bound.
" Ah ! well for us," said Peter,
" That the gates are good and strong,
And my father tends them carefully,
Or they would not hold you long !
You're a wicked sea," said Peter ;
" I know why you fret and chafe ;
You would like to spoil our lands and homes,
But our sluices keep you safe ! "
But hark ! Through the noise of the waters
Comes a low, clear, trickling sound ;
And the child's face pales with terror,
And his blossoms drop to the ground.
He is up the bank in a moment,
And, stealing through the sand,
He sees a stream not yet so large
As his slender, childish hand.
'Tis a leak in the dyke ! He is but a boy,
Unused to fearful scenes ;
But, young as he is, he has learned to know
The dreadful thing that means.
A leak in the dyke ! The stoutest heart
Grows faint that cry to hear,
And the bravest man in all the land
Turns white with mortal fear :
For he knows the smallest leak may grow
To a flood in a single night ;
And he knows the strength of the cruel
sea
When loosed in its angry might.

And the boy ! he has seen the danger,
And, shouting a wild alarm,
He forces back the weight of the sea
With the strength of his single arm !
He listens for the joyful sound
Of a footstep passing nigh ;
And he lays his ear to the ground to catch
The answer to his cry.

And he hears the rough wind blowing,
And the waters rise and fall,
But never an answer came to him,
Save the echo of his call.
He sees no hope, no succour—
His feeble voice is lost ;
Yet what shall he do but watch and wait,
Though he perish at his post !

So, faintly calling and crying
Till the sun is under the sea,
Crying and moaning till the stars
Come out for company.
He thinks of his brother and sister,
Asleep in their safe, warm bed ;
He thinks of his father and mother,
Of himself as dying and dead,
And of how, when the night is over,
They must come and find him at last ;
But he never thinks he can leave the place
Where duty holds him fast.

The good dame in the cottage
Is up and astir with the light,
For the thought of her little Peter
Has been with her all night.
And now she watches the pathway,
As yestereve she had done ;
But what does she see so strange and black
Against the rising sun ?
Her neighbours are bearing between them
Something straight to her door—
The child is coming home, but not
As he ever came before !

" He is dead ! " she cries. " My darling ! "
And the startled father hears,
And comes and looks the way she looks,
And fears the thing she fears.
Till a glad shout from the bearers
Thrills the stricken man and wife :
" Give thanks, for your son has saved our land,
And God has saved his life ! "
So, there in the morning sunshine,
They knelt about the boy ;
And every head was bared and bent
In tearful, reverent joy.

'Tis many a year since then ; but still,
When the sea roars like a flood,
Their boys are taught what a boy can do
Who is brave, and true, and good.
For every man in that country
Takes his son by the hand,
And tells him of little Peter,
Whose courage saved the land.

They have many a valiant hero,
Remembered through the years ;
But never one whose name so oft
Is named with loving tears.
And his deed shall be sung by the cradle,
And told to the child on the knee,
So long as the dykes of Holland
Divide the land from the sea !

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MY SHIPS¹

This poem is written by Ella Wheeler Wilcox, an American poetess. She is a busy writer for the papers in New York, but she has written many poems for adult readers and some really fine verses for young folk. " My Ships " is a charming poem which young and old alike will much appreciate.

IF all the ships I have at sea
Should come a-sailing home to me,
Ah, well ! the harbour could not hold
So many sails as there would be
If all my ships came in from sea.

If half my ships came home from sea
And brought their precious freight to me,
Ah, well ! I should have wealth as great
As any king who sits in state ;
So rich the treasures that would be.
In half my ships now out at sea.

If just one ship I have at sea
Should come a-sailing home to me,
Ah, well ! the storm-clouds then might frown ;
For if the others all went down,
Still rich and proud and glad I'd be
If that one ship came back to me.

If that one ship went down at sea,
And all the others came to me,
Weighed down with gems and wealth untold,
With glory, honours, riches, gold,
The poorest soul on earth I'd be,
If that one ship came not to me.

O skies, be calm ! O winds, blow free—
Blow all my ships safe home to me !
But if thou sendest some a-wrack,
To never more come sailing back,
Send any—all that skim the sea,
But bring my love-ship home to me.

THE CHARGE OF THE LIGHT BRIGADE

The charge of the Light Brigade took place at the battle of Balaclava on October 25, 1854, in the war with Russia. It was the result of a mistaken order from a commanding officer, and in twenty-five minutes more than two-thirds of the soldiers had been killed or wounded. Lord Tennyson in this famous poem has given deathless fame to the brave soldiers who went forward fearless in obedience to command, although they knew they were going to almost certain death.

HALF a league, half a league,
Half a league onward,
All in the valley of Death
Rode the six hundred.
" Forward, the Light Brigade !
Charge for the guns ! " he said ;
Into the valley of Death
Rode the six hundred.

" Forward, the Light Brigade ! "
Was there a man dismay'd ?
Not tho' the soldiers knew
Someone had blunder'd :
Theirs not to make reply,
Theirs not to reason why,
Theirs but to do and die :
Into the valley of Death
Rode the six hundred.

Cannon to right of them,
Cannon to left of them,
Cannon in front of them
Volley'd and thunder'd ;
Storm'd at with shot and shell,
Boldly they rode and well,
Into the jaws of Death,
Into the mouth of Hell
Rode the six hundred

Flash'd all their sabres bare,
Flash'd as they turn'd in air,
Sabring the gunners there,
Charging an army, while
All the world wonder'd :
Plunged in the battery-smoke,
Right thro' the line they broke ;
Cossack and Russian
Reel'd from the sabre-stroke,
Shattered and sunder'd.
Then they rode back, but not—
Not the six hundred.

Cannon to right of them,
Cannon to left of them,
Cannon behind them
Volley'd and thunder'd ;
Storm'd at with shot and shell,
While horse and hero fell,
They that had fought so well
Came thro' the jaws of Death,
Back from the mouth of Hell,
All that was left of them,
Left of six hundred.

When can their glory fade ?
O the wild charge they made !
All the world wonder'd.
Honour the charge they made !
Honour the Light Brigade,
Noble six hundred !

COUNSEL TO GIRLS

This pretty little poem is by Robert Herrick, a well-known English poet of the sixteenth century, and has been set to music.

GATHER ye rosebuds while ye may,
Old Time is still a-flying ;
And this same flower that smiles to-day,
To-morrow will be dying.

The glorious lamp of Heaven, the sun,
The higher he's a-getting
The sooner will his race be run,
And nearer he's to setting.

That age is best which is the first,
When youth and blood are warmer ;
But being spent, the worse, and worst
Times, still succeed the former.

Then be not coy, but use your time ;
And while ye may, go marry ;
For having lost but once your prime,
You may for ever tarry.

TEARS, IDLE TEARS

The following poem by Alfred Tennyson is selected from "The Princess," and has a wonderful beauty and pathos all its own.

TEARS, idle tears, I know not what they mean.
Tears from the depth of some divine
despair
Rise in the heart, and gather to the eyes,
In looking on the happy autumn fields,
And thinking of the days that are no more.

Fresh as the first beam glittering on a sail,
That brings our friends up from the under
world ;
Sad as the last which reddens over one
That sinks with all we love below the verge—
So sad, so fresh, the days that are no more.

Ah, sad and strange as in dark autumn dawns
The earliest pipe of half-awaken'd birds
To dying ears, when unto dying eyes
The casement slowly grows a glimmering
square ;
So sad, so strange, the days that are no more.

Dear as remember'd kisses after death,
And sweet as those by hopeful fancy feign'd
On lips that are for others ; deep as love,
Deep as first love, and wild with all regret—
O death in life, the days that are no more.

A MUSICAL INSTRUMENT

"A Musical Instrument" is considered one of the finest poems of the English poetess, Elizabeth Barrett Browning, and points out the fact that nothing that is worth while in this world is accomplished without its sacrifice and pain.

WHAT was he doing, the great god Pan,
Down in the reeds by the river ?
Spreading ruin and scattering ban,
Splashing and paddling with hoofs of a goat,
And breaking the golden lilies afloat
With the dragon-fly on the river.

He tore out a reed, the great god Pan,
From the deep, cool bed of the river :
The limpid water turbidly ran,
And the broken lilies a-dying lay,
And the dragon-fly had fled away,
Ere he brought it out of the river.

High on the shore sat the great god Pan,
While turbidly flow'd the river ;
And hack'd and hew'd as a great god can
With his hard bleak steel at the patient reed,
Till there was not a sign of a leaf indeed
To prove it fresh from the river.

He cut it short, did the great god Pan
(How tall it stood in the river !),
Then drew the pith, like the heart of a man,
Steadily from the outside ring,
And notch'd the poor dry empty thing
In holes, as he sat by the river.

"This is the way," laugh'd the great god Pan
(Laugh'd while he sat by the river),
"The only way, since gods began
To make sweet music, they could succeed."
Then dropping his mouth to a hole in the reed,
He blew in power by the river.

Sweet, sweet, sweet, O Pan !
Piercing sweet by the river !
Blinding sweet, O great god Pan !
The sun on the hill forgot to die,
And the lilies reviv'd, and the dragon-fly
Came back to dream on the river.

Yet half a beast is the great god Pan,
To laugh as he sits by the river,
Making a poet out of a man :
The true gods sigh for the cost and pain—
For the reed which grows nevermore again
As a reed with the reeds in the river.

WEIGHING THE BABY

This little poem was written by Ethel Lynn, and some of the baby's own charm has crept into its verses.

HOW many pounds does baby weigh ?
 "Baby" who came a while ago ;
 How many pounds from crowning curl
 To rosy point of the restless toe ?
 Nobody weighed the baby's smile,
 Or the love that came with the helpless one
 Nobody weighed the threads of care
 From which a human life is spun.
 Nobody weighed the baby's soul,
 For here on earth no weights there be
 That could avail ; God only knows
 Its value through eternity.
 O mother, sing your merry note !
 O father, laugh but don't forget
 From baby's eyes looks out a soul
 To be in Eden's light reset !

THE HAPPIEST LAND

The poet Longfellow has adapted the following ballad from a German original. It illustrates the vanity of earthly joys.

THERE sat one day in quiet,
 By an alehouse on the Rhine,
 Four hale and hearty fellows
 And drank the precious wine.

The landlord's daughter filled their cups,
 Around the rustic board ;
 Then sat they all so calm and still,
 And spake not one rude word.

But when the maid departed,
 A Swabian raised his hand,
 And cried, all hot and flushed with wine,
 "Long live the Swabian land !

"The greatest kingdom upon earth
 Cannot with that compare ;
 With all the stout and hardy men,
 And the nut-brown maidens there."

"Ha !" cried a Saxon, laughing—
 And dashed his beard with wine—
 "I had rather live in Lapland,
 Than that Swabian land of thine !

"The goodliest land on all this earth,
 It is the Saxon land !
 There have I as many maidens
 As fingers on this hand !"

"Hold your tongues ! both Swabian and
 Saxon !"
 A bold Bohemian cries ;
 "If there's a heaven upon this earth,
 In Bohemia it lies.

"There the tailor blows the flute,
 And the cobbler blows the horn,
 And the miner blows the bugle,
 Over mountain gorge and bourn."

And then the landlord's daughter
 Up to Heaven raised her hand,
 And said, "Ye may no more contend—
 There lies the happiest land !"

THE RETIRED CAT

William Cowper, the gentle and observant poet of domestic life, though not often given to humor, has a sly touch of that quality in this charming poem about his cat, which got shut in a drawer, and by doing so gave its master an opportunity to point an excellent moral not only for cats but for all of us.

A POET'S cat, sedate and grave,
 As poet well could wish to have,
 Was much addicted to inquire
 For nooks to which she might retire,
 And where, secure as mouse in chink,
 She might repose, or sit and think.
 Sometimes ascending, debonair,
 An apple-tree, or lofty pear,
 Lodged with convenience in the fork,
 She watch'd the gardener at his work ;
 Sometimes her ease and solace sought
 In an old empty watering-pot ;
 There, wanting nothing save a fan
 To seem some nymph in her sedan,
 Apparel'd in exactest sort,
 And ready to be borne to court.

But love of change it seems has place
 Not only in our wiser race ;
 Cats also feel, as well as we,
 That passion's force, and so did she.
 Her climbing, she began to find,
 Exposed her too much to the wind,
 And the old utensil of tin
 Was cold and comfortless within.
 She therefore wish'd, instead of those,
 Some place of more serene repose,
 Where neither cold might come, nor air
 Too rudely wanton with her hair ;
 And sought it in the likeliest mode
 Within her master's snug abode.

A drawer, it chanced, at bottom lined
 With lincn of the softest kind,
 With such as merchants introduce
 From India, for the ladies' use—
 A drawer impending o'er the rest,
 Half open, in the topmost chest,
 Of depth enough, and none to spare,
 Invited her to slumber there.
 Puss, with delight beyond expression,
 Survey'd the scene and took possession.
 Recumbent at her ease, ere long,
 And lull'd by her own hum-drum song,
 She left the cares of life behind,
 And slept as she would sleep her last ;
 When in came, housewifely inclined,
 The chambermaid, and shut it fast,
 By no malignity impelled,
 But all unconscious whom it held

Awaken'd by the shock, cried Puss,
 "Was ever cat attended thus !
 The open drawer was left, I see
 Merely to prove a nest for me ;
 For soon as I was well composed,
 Then came the maid, and it was closed.
 How smooth these kerchiefs, and how sweet !
 Oh, what a delicate retreat !
 I will resign myself to rest
 Till Sol, declining in the west
 Shall call to supper, when no doubt
 Susan will come and let me out."

The evening came, the sun descended
 And Puss remain'd still unattended

The night roll'd tardily away,
(With her, indeed, 'twas never day.)
The sprightly morn her course renew'd,
The evening grey again ensued ;
And Puss came into mind no more
Than if entomb'd the day before.
With hunger pinch'd, and pinch'd for room,
She now presaged approaching doom,
Nor slept a single wink or purr'd,
Conscious of jeopardy incur'd.

That night, by chance, the poet, watching,
Heard an inexplicable scratching ;
His noble heart went pit-a-pat,
And to himself he said : " What's that ? "
He drew the curtain at his side,
And forth he peep'd, but nothing spied ;
Yet, by his ear directed, guess'd
Something imprison'd in the chest,
And, doubtful what, with prudent care
Resolved it should continue there.
At length a voice which well he knew,
A long and melancholy mew,
Saluting his poetic ears,
Consoled him and dispell'd his fears.
He left his bed, he trod the floor,
And 'gan in haste the drawers explore
The lowest first, and without stop
The rest in order, to the top ;
For 'tis a truth well known to most :
That whatsoever thing is lost,
We seek it, ere it come to light,
In every cranny but the right.
—Forth skipp'd the cat, not now replete,
As erst, with airy self-conceit,
Nor in her own fond apprehension
A theme for all the world's attention :
But modest, sober, cured of all
Her notions hyperbolical,
And wishing for a place of rest
Anything rather than a chest.
Then stepp'd the poet into bed
With this reflection in his head :

MORAL

Beware of too sublime a sense
Of your own worth and consequence !
The man who dreams himself so great,
And his importance of such weight,
That all around, in all that's done,
Must move and act for him alone,
Will learn in school of tribulation,
The folly of his expectation.

TOM BOWLING

This song by Charles Dibdin is one of the most popular of sea songs, and deservedly so, for its pure and simple pathos.

HERE, a sheer hulk, lies poor Tom Bowling,
The darling of our crew ;
No more he'll hear the tempest howling,
For death has broach'd him to.
His form was of the manliest beauty,
His heart was kind and soft ;
Faithful below, he did his duty ;
But now he's gone aloft.

l'om never from his word departed,
His virtues were so rare.
His friends were many and true-hearted,
His Poll was kind and fair :
And then he'd sing, so blithe and jolly,
Ah, many's the time and oft !
But mirth is turn'd to melancholy,
For Tom is gone aloft.

Yet shall poor Tom find pleasant weather,
When he, who all commands,
Shall give, to call life's crew together.
The word to pipe " all hands,"
Thus Death, who kings and tars despatches,
In vain Tom's life has doff'd :
For though his body's under hatches,
His soul has gone aloft.

THE OFFICER'S GRAVE

Henry Francis Lyte, the author of the following poem, was born near Kelso in 1793 and died in the south of France in 1847. He was a clergyman and wrote many hymns sung in all the churches, the best known of these being " Abide with me."

THERE is in the wide, lone sea
A spot unmark'd, but holy ;
For there the gallant and the free
In his ocean-bed lies lowly.

Down, down, within the deep
That oft to triumph bore him,
He sleeps a sound and pleasant sleep
With the salt waves dashing o'er him.

He sleeps serene and safe
From tempest or from billow,
Where the storms that high above him chafe
Scarce rock his peaceful pillow.

The sea and him in death,
They did not dare to sever ;
It was his home while he had breath :
'Tis now his rest for ever !

Sleep on, thou mighty dead !
A glorious tomb they've found thee ;
The broad blue sky above thee spread :
The boundless waters round thee.

O GOD OUR HELP IN AGES PAST

This beautiful hymn by Dr. Isaac Watts, first published in his " Psalms of David " in 1719, is generally regarded as the finest he has written. In its original form it consisted of nine verses, but has since been reduced to six. Charles Wesley, the brother of the great man who founded the Methodist Church, altered the hymn in several parts, and changed the first line to " O God, our help in ages past." This form is retained in most of the present-day collections of hymns, and is here given.

O GOD, our help in ages past,
Our hope for years to come,
Our shelter from the stormy blast
And our eternal home.

Beneath the shadow of Thy throne
Thy saints have dwelt secure,
Sufficient is Thine arm alone,
And our defence is sure

Before the hills in order stood,
Or earth received her frame,
From everlasting Thou art God,
To endless years the same.

A thousand ages in Thy sight
Are like an evening gone :
Short as the watch that ends the night
Before the rising sun.

Time, like an ever-rolling stream,
Bears all its sons away ;
They fly forgotten as a dream
Dies at the opening day.

O God, our help in ages past,
Our hope for years to come,
Be Thou our guard while troubles last
And our eternal home.

LITTLE VERSES FOR VERY LITTLE PEOPLE

THE CAT'S TEA-PARTY

FIVE little pussy-cats, invited out to tea,
 Cried, "Mother, let us go. Oh, do! for good we'll surely be!
 We'll wear our bibs and hold our things as you have shown us how—
 Spoons in right paws, cups in left—and make a pretty bow;
 We'll always say, 'Yes, if you please,' and 'Only half of that!'"
 "Then go, my darling children," said the happy mother cat.



The five little pussy-cats went out that night to tea,
 Their heads were smooth and glossy, their tails were swinging free;
 They held their things as they had learned, and tried to be polite—
 With snowy bibs beneath their chins they were a pretty sight.



But, alas! for manners beautiful and coats as soft as silk,
 The moment that the little kits were asked to take some milk
 They dropped their spoons, forgot to bow, and—oh, what do you think?
 They put their noses in their cups, and all began to drink!
 Yes, every naughty little kit set up a meow for more,
 They knocked the teacups over, and scampered through the door!



BAA, BAA, BLACK SHEEP

Baa, baa, black sheep, Have you an-y wool? Yes, sir, yes, sir, three bags full;

One for the mas-ter, and one for the dame, And one for the lit-tle boy that cries down the lane.

The Book of OUR OWN LIFE

WHAT THIS STORY TELLS US

WE have already learned how and why we breathe. In these pages we read what happens to the air we breathe, and the best way to breathe well and safely. We must try to live in air that is not too warm or too moist, or that is not kept in constant motion so as to rid the body of the warm moist air that clings to it and makes us feel so uncomfortable. We require fresh air by night as well as by day—even though there are still people who think that night air is not safe to breathe. If we do not live in fresh air we are bound to suffer, for our lungs cannot protect themselves from foul air, which we were never meant to breathe, and children suffer even more than grown-up people from the effects of bad ventilation. Schoolrooms are very often insufficiently ventilated.

FRESH AIR & HEALTHY LIVES

WE are apt, perhaps, to think that the air we breathe inwardly passes right to our lungs, but that is far from true. As a matter of fact, the amount of air we breathe in in an ordinary breath is hardly enough to fill the air-passage from the nose to the bottom of the windpipe. Even though the nose warms and moistens the air, it does not do so nearly enough to make the air fit to go right into the depth of the lungs. It is thus really only the top layer of the air in our lungs that we change every time we breathe, and the rest is done by what is called diffusion—the new air gradually passing down into the lungs, and the old air passing up. The difference between air breathed in and air breathed out can be easily stated. In the course of being breathed, air loses oxygen, whilst, on the other hand, it gains carbon dioxide, water, heat, and a small amount of waste matter from the lungs.

We give off much more carbon dioxide than usual when we take exercise, and also for some time after a meal; especially if there has been a good deal of sugar and fat in the food, for these things are quickly burnt, producing carbon dioxide. We breathe less at night, and older people breathe less than younger people. We breathe much more vigorously and more deeply and

CONTINUED FROM 1652



better in the presence of light—a most important fact which should never be forgotten. We breathe much more vigorously in cold weather, since we naturally require more heat in order to keep the warmth of the blood up to the mark, and breathing supplies oxygen for the fuel of the body.

It is very interesting to observe the vigor of breathing in different creatures. The small song-birds are the most vigorous breathers of all. This is not surprising if we think of the enormous amount of work a bird does when it is both flying and singing.

The possibility of breathing at all depends upon the fact that there is more oxygen in the air outside than in the blood, and that there is less carbon dioxide in the air outside than in the blood. The interchange of the gases is only possible because this is so. It is possible to measure exactly the amount of carbon dioxide in the air, and to say at what point that amount becomes too high for safety. If we attempt to breathe air containing too much carbon dioxide, the carbon dioxide in our blood cannot get out, or cannot get out quickly enough, and we must die.

There is a cave in Italy, called the Cave of Dogs, where the air contains a great deal of carbon dioxide. Owing to the fact that carbon dioxide is heavier than the air, it lies in a layer upon the floor, with the result

that a man going into the cave can breathe there because his mouth is above the level of the carbon dioxide, while a dog will fall down unconscious because its nose is below the surface of the carbon dioxide, and so it cannot breathe.

THE MISTAKEN IDEA OF THE LAW AND HOW IT SHOULD BE ALTERED

Some day the law of the land will lay down definite rules as to the quality of the air in shops, and workshops, and factories, and so on. Already there are rules as to the number of feet of space that should be allowed for each person, but these rules are not nearly enough. It is no good having many cubic feet of space for each person if the air in that space is not changed. If you put a single man in Carnegie Hall, New York, and could close the hall entirely so that no air could get in or out, the time would come—and it would not be so long as you would think—when he would be suffocated and die. At present the law thinks that it is only necessary to order so many feet of space. What it should really do is to order so many feet of space, and then order that the air in that space be changed as often as is necessary. If a man is in a room ten feet in each direction, he has a thousand cubic feet of space. The whole of the air in that space should be changed every twenty minutes if he is not to be injured. In some of the most magnificent stores in New York the saleswomen can be seen pale and tired, and without appetite, and a large number of them may soon die of tuberculosis, simply because the air is not often enough changed.

HOW GRACE DARLING DIED THROUGH SLEEPING WITH HER WINDOW CLOSED

Many of them are doubtless themselves partly to blame for their carelessness about their own bedrooms; or rather the State is to blame for not having taught them the things that matter when they were children. We know that if a single person were put to sleep in the largest bedroom in America, and the air were not changed in it at all, except by himself, it would be unfit to breathe long before the morning. Of course, the smaller the bedroom the more serious it would be; but I want to insist that even the largest room does not contain sufficient air to last through a whole night without being changed. That is

why it is our duty to keep our bedroom windows open. Grace Darling, whose story is told on page 1743, died of tuberculosis, though during the day she breathed the splendid sea air, because at night she slept in a tiny little room with a closed window. After all, we have to spend about a third of our whole lives asleep, and children should spend even more than that proportion; so it is worth while making sure that we breathe pure air during that time.

Everyone should sleep in a bedroom with a window open. Rooms that have no windows, or windows that will not open, are not fit for people to sleep in. The "box" beds in which some people have to sleep in Scotland are very bad indeed, and people sleeping in them are very apt to get tuberculosis. It is best to open the window at the top, and the top sash should be pulled right down—three or four inches is not enough. This may make a draught between the window and the door or fireplace, but that does not matter at all if the head of the bed is placed out of the draught.

HOW THE CHIMNEY HELPS TO KEEP US HEALTHY

An open chimney is very good for helping to keep the air in a room fresh. When it is not used, as in summer-time, a chimney should never be closed, for this simply prevents the bad air from getting through it, and every opening of this kind to a room should be welcome. Open windows at night sometimes rattle, and people are apt to shut them then; but all you need is a couple of wedges to make the sash firm so that it will not rattle, and then you need not run the risk of spending the night in impure air.

There is a very general belief that night air is dangerous for us to breathe; but this is nonsense. Chemists have very carefully examined the air in the day and in the night, and now we know that night air is purer than day air. Fewer fires and furnaces are burning at night, and so the air in cities contains less carbon dioxide. Also, as there is less traffic, there is less dust in the air at night. We know exactly how the old belief as to night air arose, and the history of it is very interesting.

It was noticed that people who exposed themselves to the night air in certain parts of the world were very apt

to get a serious disease which was supposed to be due to the quality of the air. So, long ago this disease was called *malaria*, which simply means *bad air*, and the disease is known by that name to this day. But we have lately found that it is due to the bite of a certain kind of insect which carries the microbes of the disease, and this insect is a kind of mosquito. It only bites at night. There are no mosquitoes of this kind in England, and there is no malaria in that country except in the case of a few people who have brought it from abroad ; but they cannot give it to other people, since the mosquito that carries the disease does not exist there.

So far as many countries are concerned night air is purer and better than day air, and there is nothing to be said against it. Thousands of people are killed by night air even in America, but it is the foul night air which they have made in their own bedrooms, and have not allowed to escape. This weakens their bodies in every way, and especially in such a way that the microbes of tuberculosis can enter and destroy them.

WHAT HAPPENS WHEN WE LIVE IN AIR THAT IS NOT FRESH

It is impossible to say too much good about fresh air, or to say too much about the difference between living in fresh air and impure air. So far as solid matter and microbes in the air are concerned, we have a certain amount of protection so long as we breathe through our noses, but the nose-filter, though it is quite sufficient for the kind of air we ought to breathe, is not sufficient to filter the kind of air many of us *do* breathe ; and, so far as bad gases are concerned, we have absolutely no protection at all. If there is too much heat and moisture in the air of our room, and if it becomes stagnant because it is not stirred up enough, then the circulation of the blood in the skin is much interfered with.

The consequence is that we are living with our tissues and organs not working at their best. Every tissue in the body suffers, but that which suffers soonest and most is the brain, which needs pure blood even more than any other part of the body. Thus the bad ventilation of schoolrooms is one of the chief reasons why children cannot attend to their

lessons, or fall asleep during their lessons, or fail to remember what they have learned. It is also one of the reasons why many children do not grow properly, for the brain presides over the growth of the whole body, and it cannot do this if it is fed with impure blood, such as many unfortunate children have to make the best of during the whole time they spend indoors, whether by day or night.

HOW BAD GASES IN THE AIR POISON OUR BRAIN AND GIVE US HEADACHE

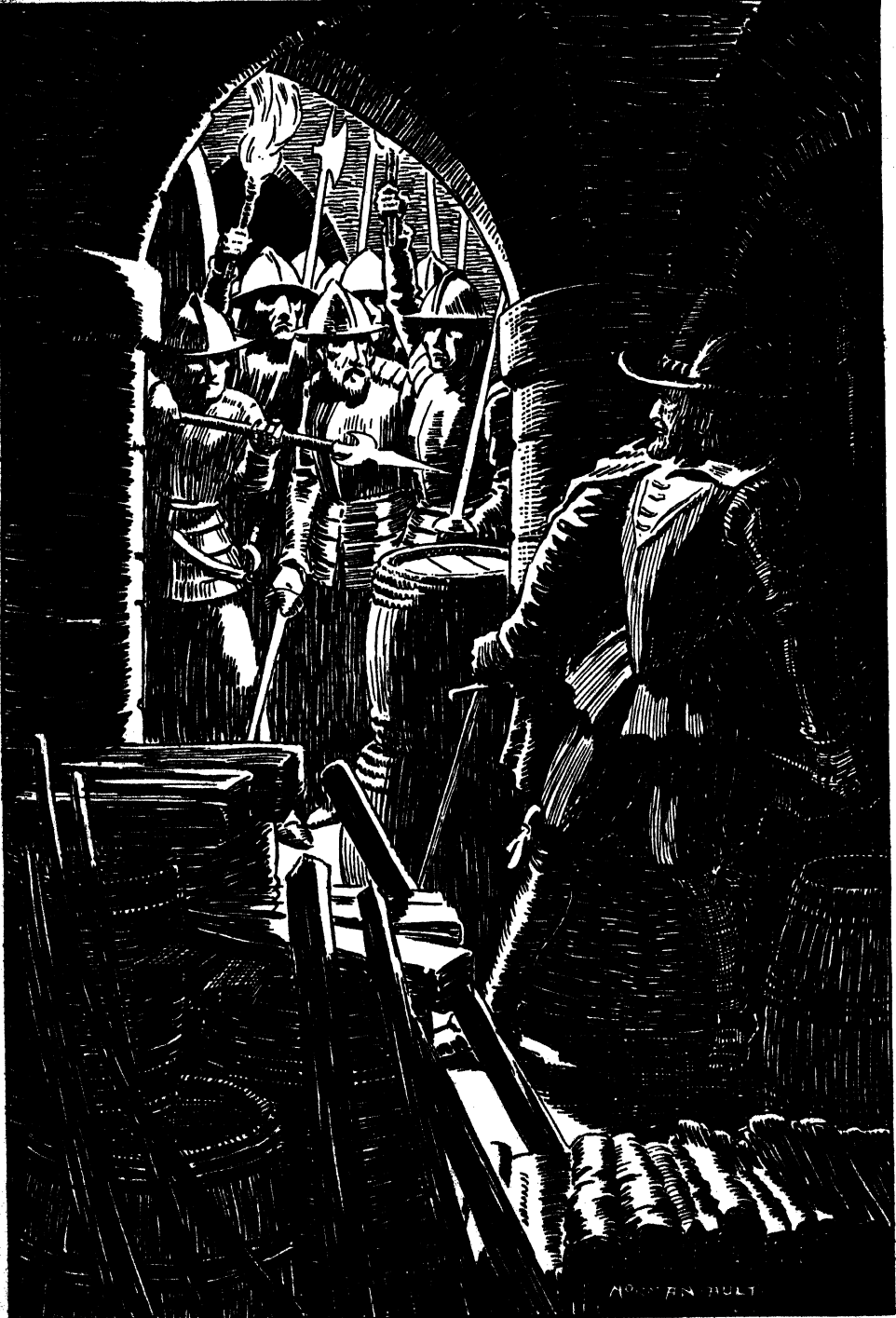
As regards the other bad gases in air, most of which have been given off by the lungs and skin either of ourselves or of others, the body has no means of protection against them at all. They pass into the blood from the lungs quite readily, the lung-cells being unable to stop them at all, and then the blood carries them to every part of the body and distributes them—to our great injury. Sometimes we can guess that something is wrong by the presence of headache or by lack of appetite, both of which show that the brain has been poisoned. But often we notice nothing at all, though the damage is being done just the same. Children left to grow in impure air suffer just as plants grown in impure air would suffer, or fishes grown in water which is not changed—and all three for the same reason.

HOW BAD AIR IS HELPING TO WEAKEN THE RACE

Many people talk nonsense about this subject. They use a long word which means that some nations are becoming smaller and weaker and stunted ; that they have had their time of success, and that the nations as a whole are dying. But, as a matter of fact, babies generally are as fine now as ever they were, only people try to grow too many of them in bad air to which no rich man would expose his horses, and are not wise enough to blame themselves when they see the bad results. But, at the very least, I hope that what we have learned about the lungs and their importance for our lives will teach us how to protect ourselves from enemies, most of which can be quite easily avoided if only we have a little knowledge and are willing to apply it.

THE NEXT PART OF THIS IS ON PAGE 1921.

THE LIGHT OF THE LANTERN FELL UPON GUY FAWKES



Guy Fawkes was really a brave, handsome soldier, who feared no enemy and loved a fight. He and some other Roman Catholics in England were so angry with King James I. and his Parliament because they oppressed the Catholics that they made a plot to blow up the Houses of Parliament on the day the king opened it in person. The plot was betrayed and Guy Fawkes was captured beside the barrels of gunpowder.

The Book of STORIES



Some of the friends of Guy Fawkes in his plot

GUY FAWKES AND HIS PLOT

Please to remember the
Fifth of November,
Gunpowder, treason, and
plot.

CONTINUED FROM 1711

Guy Fawkes, Guy! Stick him up on
high!
Hang him to a lamp-post and there
let him die!

WHEN the yellow fogs roll up from
Father Thames, drenching
area railings, door-knockers, pillar-
boxes, lamp-posts, policemen, and
even the muffin man with his cheerful
bell; and when the gas has to be
lighted all day long, and every other
old gentleman on the streets of London
is coughing himself the color of a
lobster; then it is, in this dismal
month of November, that dozing old
ladies, with shawls over their shoulders
and mittens on their hands, start at
their fireside to hear the fierce and
murderous cry of "Guy Fawkes,
Guy! Stick him up on high!"

Every Fifth of November, in fair
weather and in foul, effigies of this Guy
Fawkes are borne through the streets
by boys who look like fiendish demons
in their pink masks and cocked hats
made out of newspaper. For three
hundred years the Fifth of November
has been set aside for the burning of
this scarecrow guy—this hideous and
comical scarecrow, which now makes
the Londoner laugh, but once made
his ancestors grind their teeth and
mutter: "To the bonfire with him!
Burn him! Burn the brute!"

But though he laughs
at the scarecrow, and
though his ancestors
called it a brute, it

represents a very handsome and
dashing gentleman, who once
breathed good Yorkshire air, rode
a horse with grace, and could swing
as long a sword as any soldier of his
time. Guy Fawkes came of a good
old Yorkshire family, and was a soldier
who feared no enemy and loved a
fight. It chanced that he once fell
into intimate talk with a Roman
Catholic gentleman named Catesby.
Fawkes was a Roman Catholic too,
and in their talk they conversed about
the injustice which Catholics had to
endure under a Protestant king.
Catesby found the brave Fawkes hot
as any man of his acquaintance against
the Protestants, and very soon he laid
bare to this gallant soldier a scheme
for getting rid of the Protestants.

Parliament was to meet on the Fifth
of November. The king would be
there and all the nobility. To blow
them up with gunpowder would be to
get rid of Protestantism, and bring a
child to the throne, who could very
soon be made a good Catholic. The
scheme was not so difficult as it
sounded. Under the Houses of Parlia-
ment there were cellars, which mer-
chants rented for the storing of goods.
The conspirators could hire one of
these cellars, could roll in barrels of

gunpowder, and on the great day some one would be found bold enough to set fire to the explosive.

Guy Fawkes at once volunteered for this post of danger. He was ready to sacrifice himself for what he considered a good cause.

Everything prospered with the idea. A cellar was found right under the House of Lords. The gunpowder was procured. Faggots of brushwood were smuggled in. There was nothing to do but wait for the day. But among the conspirators there was a gentleman named Sir Thomas Tresham, whose brother-in-law was a peer, Lord Monteagle. The thought of letting his brother-in-law go unwarned to his death stung the conscience of Sir Thomas Tresham and would not let him rest.

Late in the month of October a man in a long cloak suddenly presented himself at the supper-table of Lord Monteagle, threw down a letter, and disappeared as quickly as he had come. The letter said :

My lord, out of the love I bear to some of your friends, I have a care of your preservation, therefore I would advise you, as you tender your life, to devise some excuse to shift your attendance at this Parliament, for God and man hath concurred to punish the wickedness of this time ; and think not slightly of this advertisement, but retire to yourself into your country, where you may expect the event in safety ; for though there be no appearance of any stir, yet I say they shall receive a terrible blow this Parliament, and yet they shall not see who hurts them.

Lord Monteagle carried this letter to Cecil, the statesman of King James, and Cecil bore it to the King. "They shall receive a terrible blow this Parliament," pondered King James, who was said to be the wisest fool in Christendom, "and yet they shall not see who hurts them." He stroked his chin and reflected. Then a light came into his eyes ; he looked up quickly at Cecil. "This smells. *Gunpowder*," he said.

They kept their idea very dark. At midnight on the fourth of November a magistrate named Sir Thomas Knevelt and a squad of soldiers made their way noiselessly through cellars under the Houses of Parliament.

They encountered no conspirators, and saw nothing to arouse their suspicions.

On they went, the orange light from their lanterns flinging weird shadows over the low cobwebbed ceilings, the reeking walls, and the soft, damp floors.

Suddenly they came upon a cellar where, under piles of brushwood, could be seen barrels ranged side by side in great numbers. The lanterns were lifted on high. A ray of light pierced to a dark corner. There, clean-cut against the dark wall, could be seen the delicate, shadowy outline of a man's face ; and nearer, the thin, shining line of a long sword. In an instant the soldiers rushed forward and flung themselves upon the conspirator, who, though he fought savagely, was soon overpowered and bound a prisoner.

"Oh, would I had been quicker !" panted Fawkes ; "would I had set fire to the powder ! Death would have been sweet had some of my enemies gone with me."

He was carried to the Tower. There he was put upon the rack and tortured ; but though his muscles snapped and his bones cracked, he refused to tell the names of the other conspirators. He was told that they had fled and had been arrested. "Then it is useless to name them," said Fawkes, "for they have named themselves."

But his courage was in vain. One after another the conspirators were discovered, and death followed death in rapid succession. "How could you bear the thought of causing my children and so many innocent persons to perish ?" asked King James. "For desperate ills there must be desperate remedies," was the reply. A Scottish courtier asked him why he had collected so much powder. "I had purposed to cause all the Scots to be blown as far as Scotland," answered Fawkes gravely.

The whole country was roused by news of the plot.

"Death to the Papists !" was the cry on every side ; and if Roman Catholics had suffered before, they suffered a hundred times more afterwards.

Guy Fawkes—the gallant and brave soldier, but a misled and bigoted Catholic—was executed on February 6, 1606. We almost forget his malign and murderous intention in remembering the wonderful pleasure he has given to all sorts and conditions of boys for over three hundred years.

THE FABLES OF ÆSOP THE SLAVE

THE WOLF AND THE LAMB

ONE very hot day, a wolf and a lamb came at the same time to a mountain stream to quench their thirst.

The wolf stood higher up the hillside than the lamb; but, wanting to pick a quarrel, the wolf called out, "What do you mean by disturbing the water and making it so muddy that I cannot drink?" The lamb answered that it could not be so, because the water was running downhill from the wolf to him, and therefore could not be disturbed higher up the stream.

"Never mind," answered the wolf. "You have behaved very badly, and I



am told that you were calling me names behind my back more than a year ago." The lamb exclaimed, "But that is impossible, for it was before I was born!"

The wolf then flew into a great passion and exclaimed, "If it was not you, it must have been your father, and it comes to the same thing."

Then he seized the poor lamb, tore it to pieces, and ate it.

When anyone has made up his mind to quarrel with another, it is easy enough to find an excuse.

THE SNAKE AND THE FILE

A SNAKE one day crept into a blacksmith's shop and chanced to knock against a steel file. This hurt the

snake slightly, and, flying into a rage, he at once bit the file as hard as he could. The hard steel file cut the snake's mouth; but when he saw the blood he thought it was the file that bled, and



so he bit it again and again until he had damaged his own mouth very badly.

When we try to hurt other people we are much more likely to get hurt ourselves.

THE HORSE AND GROOM

A MAN who was very proud of the horse he had charge of spent hours every day brushing its coat. But the man was not honest. He used to sell the horse's food and keep the money, and the animal soon began to grow thin, making the man angry.

"It is no use being angry with me," said the horse. "If you want me to be



a fine horse you must give me the food you are stealing from your master."

We cannot succeed well with anything unless we are honest.

JACK THE GIANT KILLER.

IN the days of King Arthur there lived a farmer's son named Jack. Not far away from Jack's home was a cave, and in the cave lived a horrible giant, called Cormoran.

Cormoran was three times as big as any other man; his appetite was so enormous that the only way he could get enough food to eat was by stealing all the sheep and oxen he could find. For one meal the giant could eat as much as six oxen and twelve sheep, and Jack's father said that if this went on much longer all the farmers for miles round would be ruined.

This set Jack thinking, and, being a brave lad, he determined to find a way to kill him.

So one night Jack set out for the mount in which was the giant's cave. With a spade he dug a deep pit and covered it with sticks and gravel, so that it looked like earth. Then, when all was ready, he blew a loud blast on his cow-horn and waited.

The giant awoke in a terrible rage, and came stamping down the mount to see who had dared to come so near his cave. Suddenly he caught sight of Jack.

"You young rascal!" he cried in an awful voice. "I'll kill you and eat you for my supper!"

He rushed after Jack, but just before he reached him his foot caught in the pit, and down he came, crash! Up jumped Jack, and in a twinkling he drew out his axe and chopped off Cormoran's head.

Jack ran all the way home, and the farmers were so delighted at being rid of the monster that they presented the hero with a sword, and named him "Jack the Giant Killer."

Jack was so proud of his success that he determined to rid the world of another monster, named Blunderbore, who lived in a castle in the midst of a lovely forest.

Jack set out bravely, but the day was warm, and he had not gone very far when, overcome by the heat, he lay down under a tree and fell asleep. Soon Blunderbore came along, and, catching sight of Jack, he picked him up, flung him over his shoulder, and carried him to his castle.

When Jack awoke and found himself in the giant's castle, he was in an awful fright. Through the window he could hear the cries and groans of the giant's other victims, and his teeth began to chatter.

"This is dreadful," he said to himself. "I must find a way out of this place somehow."

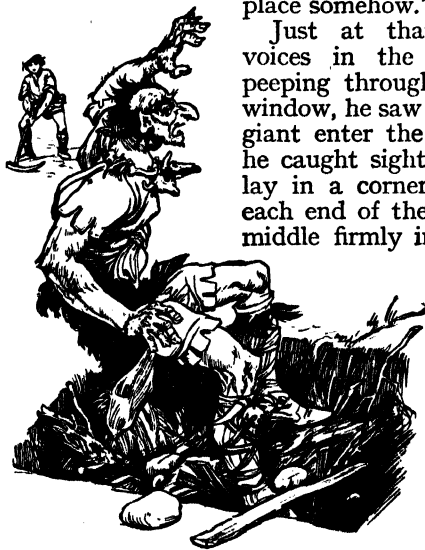
Just at that moment Jack heard voices in the courtyard below, and, peeping through the rails of his prison window, he saw Blunderbore and another giant enter the castle. Looking round, he caught sight of a coil of rope which lay in a corner. He made a noose at each end of the rope, and, grasping the middle firmly in his hand, he flung an

end over the two giants' heads. Quick as lightning he swung the rope round a beam by the window, and then, holding on to it with all his might, he pulled it tight until both giants were strangled.

Jack set free all the knights and ladies whom Blunderbore had imprisoned in his castle, and set out again upon new adventures.

The next evening he found himself at the door of a lonely castle in Wales. He knocked, and, to his amazement, the door was opened by a tremendous giant with two heads. Jack was startled; but the giant seemed so friendly that when he offered him a bed for the night Jack gladly accepted.

Now, Jack knew that this two-headed monster had four valuable treasures, which he determined to possess—a coat that made the wearer invisible, a cap that told him all he wanted to know, a sword that could cut anything, and shoes that could carry him as swiftly as the wind. Jack went to bed, and



The giant rushed after Jack, but suddenly his foot caught in the pit, and down he came, crash!

soon fell asleep. In the middle of the night he was awakened by someone singing; and this is what he heard:

"Though you shall lodge with me this night,
You shall not see the morning light;
My club shall dash your brains out quite."

"Ho, ho!" cried Jack, looking round for a log of wood which he had noticed by the fireplace. Jack put the log in his bed, and waited. Presently the door opened, and in came the giant and strode up to the bed. Down came the club—crash! again and again.

"Farewell, my young friend," he bellowed. "You'll make me a fine dinner by and by."

Jack had a good laugh over this, and when the giant had gone he crept back into bed, and was soon fast asleep.

In the morning Jack walked boldly into the room where the giant was breakfasting from a huge basin of batter pudding. The giant was so astonished at seeing Jack alive that he scarcely knew what to say to him.

Jack sat down, and began to make a good breakfast. But all the time he ate he was thinking. Suddenly a grand idea came into his mind, and when the giant was not looking he hid as much of the pudding in his jersey as he could possibly get. As soon as breakfast was over, Jack said:

"You can't plunge a knife into your chest without hurting yourself. See me!"

Picking up a knife, Jack thrust it into his jersey, and out fell the pudding, piece by piece, upon the floor.

The giant did not like to be outdone by such a little creature as Jack, so he drew out his own knife, and, without

more ado, plunged it into his chest—and fell down dead.

Then Jack caught up the cap and the shoes and the coat and the sword, and went on his way.

At the next castle to which he came a great ball was taking place. The knights and ladies, who had all heard of Jack, made him welcome, and he was just beginning to enjoy himself when in rushed a messenger to say that a hideous giant was on his way to the castle.

"Have no fear," cried Jack, fastening on his invisible coat. "Leave all to me."

He put on the shoes which carried him as quickly as the wind, and went out.

Round the castle ran a moat, and when the giant reached the drawbridge that stretched across it he sniffed the air around, and roared in an awful voice:

"Fe, fi, fo, fum,
I smell the blood of
an Englishman;
Be he alive, or be he
dead,
I'll grind his bones to
make my bread."

"You must catch me first," cried Jack; and then, throwing off his coat, he led the giant a fine dance round the castle.

Jack ran on swiftly until he came again to the drawbridge. He ran across, but

as he reached the other side he bent down, and with one stroke of his magic sword severed the bridge in two just as the giant was half-way across. Down crashed the drawbridge, and into the moat fell the giant; and that was the end of him.

Jack had many other adventures, and when he was tired of them all he went home again, and married a beautiful princess whom he loved dearly.



Jack flung the noose over the heads of the giants and held on to it with all his might and main.

THE LITTLE PIXIES OF LAND'S END

IN the old days Land's End in Cornwall used to be crowded with pixies, elves, and goblins. All the sprites that were turned out of other parts of England because of their bad ways came to settle down in Land's End. None of them, however, ever troubled the fisherman and his wife who then lived there; indeed, they always rewarded the woman very handsomely whenever she did any work for them.

"The little people are very rich," the woman said to her husband. "I wonder how they come by all their money. Nobody ever saw them steal anything."

"Ah, more goes on in Cornwall than meets the eye," said the fisherman.

One night a pixy brought the woman a little baby elf to nurse, and gave her

some strange ointment to rub on its eyes every morning.

"But don't use the ointment yourself," said pixy, "or you'll be blinded."

But the woman was very curious, and she did use the ointment. Her eyes seemed neither the better nor the worse for it. Soon afterwards, however, she paid a visit to her sister at Penzance, and as she passed through the streets she saw hundreds of pixies, elves, and goblins stealing things out of all the shops.

"Oh, look at the bold little thieves!" she said to her sister.

But her sister could not see them; and then, as the woman ran wildly about, pointing to the invisible sprites, one of the pixies blew upon her eyes, and she became blind.

THE BIRD-GIRL WITH THE GOLDEN WINGS

PRINCE Jascha was one day out hunting in the Serbian mountains, when a lovely bird with golden wings fluttered slowly past him. Full of admiration for its beauty, he thought he would try to capture it alive, and bring it home to his mother. But while trying to overtake the bird he came upon a strange sight—a high hill covered with white marble statues.

It was an awesome thing to see, but Prince Jascha was not easily turned aside from any project, and was about to climb a hill, when a hermit rushed out of a cave, crying: "Rash youth, beware!" Then, more quietly, "A witch who lives inside this hill sends out the golden bird to draw travelers within her reach. These statues were all men who, in seeking to capture the bird, came within the witch's power, and have been used by her to adorn her dwelling-place. If once she sees you she will do the same to you. Your only hope of escape is to seize her by her hair before she spies you. If you can do that, you will make her helpless."

Prince Jascha was bold, but he was not rash. Abandoning for the moment his quest of the bird, he turned and climbed the hill another way. The witch, of course, was looking for him the way the bird had come, and so he was able to creep quietly behind her, and seize her by her locks. As she felt his grip, she shrieked aloud, in such an awful voice that the hills around her rocked.

But Jascha, though he was afraid, was brave, and still held on. At length the witch saw that she could not overawe him, and knowing that for evermore she would have to obey his commands, she gave up the struggle, and in a sullen voice said:

"What is it your will that I shall do?"

"I will," said Jascha sternly, "that you shall give the golden bird to me, and that you shall give these statues back their life, and restore them to their former state."

The witch submitted. First she gave the bird to Jascha, who gently kissed the frightened, trembling thing, and as his lips touched the golden feathers of its head, the enchantment in which it had been held vanished, and behold, beside him stood a lovely princess.

Then the witch breathed a blue vapor, which spread and wreathed about the hill, and as it curled around the statues, they turned back into the handsome youths that they had been before. That done, Jascha released the witch, and with one last piercing shriek she disappeared.

When she had gone, Jascha gathered the joyful group of escaped youths about him, and brought them with the golden-haired princess to Belgrade. There he married the princess, and with her he lived the rest of his life in peace and happiness.

THE NEXT STORIES BEGIN ON PAGE 1903.

The Story of THE EARTH.

WHAT THIS STORY TELLS US

BY far the greater number of all the compounds in the world belong to three great groups, called acids, alkalies or bases, and salts. If we understand how these are made we have the key to most of the chemical changes that occur, and we also learn how to understand all the chemical changes, or reactions, that are possible. Here we learn about these three kinds of compounds. It is rather hard and dry to read at first, but it is very important; and no one really has any knowledge of chemistry who has not learned what we read here. Boys and girls who like arithmetic, and have begun algebra, will not find this part so hard after all; and by studying this we understand the great principles of chemical change as it goes on for ever all over the world, and in our bodies, too.

THREE KINDS OF COMPOUNDS

THE WONDER OF ENDLESS CHANGES IN THE EARTH

THERE is no limit to the number of chemical compounds. Men devote their whole lives to the study of only one group of them. But there are certain classes of compounds which we are always meeting, and to which most of the compounds we discover, or the new compounds we are learning to make, really belong. We are all familiar with such words as *acid* and *salt*, and we may have heard the word *alkali*. These words have most important chemical meanings. Compounds made in a certain way are called acids, others are called alkalies or bases, and when an acid combines with a base—as happens when we mix a Seidlitz powder—there is formed a salt.

We think of an acid as something that has a particular kind of taste like that of a lemon; and most acids have this kind of taste, though many, such as prussic acid and carbon dioxide, have not. Chemists do not think at all of the taste when they say that one thing is an acid and another is not. They say that an acid is always a compound of hydrogen. That is easy enough to begin with. But we must add that the element or elements with which the hydrogen is combined *must not be metals*. Then we find that the hydrogen of the acid can always be replaced by a metal; and then we have a salt. Let us look at a simple instance.

Though oxygen is not a metal, the compound made of hydrogen and oxygen—water—is not an acid. That

CONTINUED FROM P. 1698



is rather an exception. But let us take the element chlorine, about which we already know something. Its symbol is Cl. One atom of hydrogen combines with one atom of chlorine, forming the compound HCl.

This is a typical acid, and is known as hydrochloric acid. Now, in a very simple way, as we shall shortly see, the hydrogen of this acid can be replaced by a metal, such as sodium, which has the symbol Na (the first two letters of its Latin name), and so we get a substance which has the formula NaCl, and is known as sodium chloride. This, according to what we have said, should be a salt; and it is indeed the common salt we eat every day, of which the sea is full.

If we think of almost any other element that is not a metal (or we may take more elements than one) we shall find that they form compounds with hydrogen, and that these are acids. If chlorine does so, we shall expect the other members of the group it belongs to to do so as well, and so they do. Thus we have hydrofluoric acid, HF; hydrobromic acid, HBr; and hydriodic acid, HI. None of these is quite so important as hydrochloric acid, which we all produce every day in our stomachs, but they have various uses of their own. There is no acid made of hydrogen and carbon alone or nitrogen alone, but there is one made of all three, having the formula HCN. This is hydrocyanic or prussic acid; and everyone has heard of it as a deadly poison.

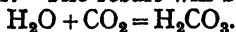
Most acids contain oxygen as well as hydrogen, though none of those we have mentioned yet do so. For instance, there is an acid made of hydrogen, nitrogen, and oxygen, with the formula HNO_3 , known as nitric acid.

AN ACID UPON WHICH THE WHOLE OF EUROPE AND AMERICA DEPEND FOR FOOD

It and the salts it forms are very important in themselves, and also because of their services to the vegetable world, and so to us. The whole of Western civilization at this moment depends on wheat grown with the aid of salts of nitric acid, called nitrates, which are added to the soil.

Similarly hydrogen, sulphur, and oxygen form an acid which has the formula H_2SO_4 and is known as sulphuric acid; and just as the salts formed from nitric acid are called nitrates, so the salts formed from sulphuric acid are called sulphates. They are also very important in many ways. These same elements form other acids in which the elements are combined in different proportions, such as nitrous acid, HNO_2 , and sulphurous acid, H_2SO_3 .

Chemistry is one of the newest of the sciences and great progress has been made in it during the last few years. At first awkward and often incorrect names were given to many substances. Hydrochloric acid was called muriatic acid. Carbon dioxide, which is CO_2 , went by the names of carbonic acid and carbonic acid gas, and these names are often used even to this day. The real carbonic acid is formed by combining carbon dioxide with water. The result will be:



THE DIFFERENT POWERS OF THE ATOMS IN COMING TOGETHER

This H_2CO_3 is a true acid, as we find directly we test it. As in the case of all acids, the hydrogen of it can be replaced by a metal, and so we get a salt, which is called a carbonate. For instance, there is calcium carbonate, CaCO_3 , one of the commonest salts in the world, which we know as chalk and marble. Then there is sodium carbonate, Na_2CO_3 , which is all-important in our blood.

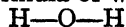
Here are the formulas of some of the principal acids we have mentioned:

HCl	Hydrochloric acid	HNO_2	Nitrous acid
		H_2SO_4	Sulphuric acid
HCN	Hydrocyanic or prussic acid	H_2SO_3	Sulphurous acid
HNO_3	Nitric acid	H_2CO_3	Carbonic acid

We notice that the hydrogen of an acid is always written first in its formula, and we notice that none of the elements found in these acids is a metal. We also see that in some of these acids there is one hydrogen atom to each molecule, while in others there are two. Then we might have mentioned phosphoric acid, H_3PO_4 , in which there are three hydrogen atoms to the molecule. This difference between acids illustrates a very important fact about all compounds, which is that the atoms of the various elements differ in their combining power. It is as if they had different numbers of hands with which to hold on to other atoms. The hydrogen atom always has only one hand, the chlorine atom has one hand, the carbon atom has four, the nitrogen atom has either three or five, the oxygen atom has two, and so on.

HOW THE CHEMIST WRITES IN "PICTURES," OR GRAPHIC FORMULAS

The formulas of these acids illustrate this very important fact. You will not imagine that I am speaking of real hands, but it is as if each atom had a certain number of hands or hooks or whatever it is that enables it to hold on to other atoms. Thus we can now learn to write our formulas in the form of little pictures, or diagrams. These are called "picture," or *graphic*, formulas. The graphic formula of water is:



and shows us that each of the *two* hands of the oxygen atom is holding on to the *one* hand of a hydrogen atom. Then we may write hydrochloric acid:



each of the two atoms having just one hand. The next acid on our list is more of a puzzle, for we remember the number of hands that carbon has, and that the nitrogen atom is sometimes three-handed and sometimes five-handed, as it were. So how do we write the graphic formula of prussic acid? Either like this:



showing the nitrogen atom as having five hands, or like this:



showing the nitrogen atom with three hands. In each case the carbon atom has four and the hydrogen atom one. As to which of these formulas really represents the way in which the molecule of prussic acid is built up, it is for chemists to find out by studying its

THREE KINDS OF COMPOUNDS

behavior when it is broken up or when salts are made.

These acids we have named and looked at are all very simple compared with the extraordinary acids which are made in and by the bodies of living creatures. For instance, there is citric acid, which we find in oranges and limes and lemons; uric acid, which is made in our own bodies; malic acid (meaning apple acid), which is found in apples; and so on. The graphic formulas of these would almost fill half this page, so large is the number of atoms in the molecule. But always we find that the acid has no metallic atoms, and that it has a certain number of atoms of hydrogen, which can be replaced by metallic atoms to form salts.

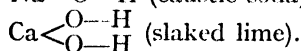
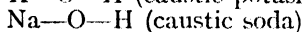
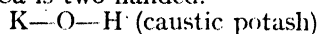
THE COMPOUNDS OF METALS, CALLED ALKALIES, OR BASES

Now we must turn to another class of compounds which we always think of as the opposites of acids. These are compounds of metals. They may or may not contain hydrogen, but they are quite different in every respect from acids. These compounds we call bases, or alkalies; and when we study any liquid in chemistry we always want to know whether it is an acid liquid or an alkaline liquid, or a liquid that is neither acid nor alkaline. There is a very easy way of finding this out in most cases. There is a dye called *litmus*, which always turns red in the presence of an acid, and always turns blue in the presence of an alkali. We put some of this dye into a sort of blotting-paper, cut it up into strips, and use it for testing the "reaction" of liquids, as we call it. We usually have both sorts of paper—blue and red. Then, if we want to find out the reaction of a liquid, we dip a piece of blue litmus in it, and find, perhaps, that it turns bright red. That proves that the liquid is acid—perhaps hydrochloric acid or nitric acid. Now, if we take that piece of reddened paper, and dip it into a solution of such a thing as ammonia, or even hold it above a bottle containing a solution of ammonia (which is really a gas), we shall find that it quickly turns blue again—proving that it has been exposed to an alkali. The good milk of a cow should give a faint acid reaction, while human milk gives a faint alkaline reaction. Thus, in feeding a baby on cow's milk,

we add something to make it alkaline, as mother's milk is. Of course, a liquid may be neither acid nor alkaline, and then we say that its reaction is *neutral*. Neither blue nor red litmus, dipped in it, shows any change.

THE WAY IN WHICH THE BASES ARE MADE UP

Now we must look at the composition of some bases. One of the best known is caustic potash, a strong alkali with the formula KOH. Here we notice at once that a *metal* is contained in the compound; it is not an acid. Also we notice that it happens to contain hydrogen; but we always write the letter representing the metal first in the formula of a base, and if there is any hydrogen in it, we write the H last, to distinguish it more completely from an acid. The name caustic means burning, for caustic potash feels as if it burned the skin, and, indeed, it destroys most living tissues very quickly. Similarly there is caustic soda, which has the formula NaOH; and also slaked lime, which has the formula Ca(OH)₂. This last formula is rather different from any we have seen. You will notice the brackets, which are used to show that the figure following the brackets applies to all the letters within the brackets. Let us write the graphic formulas of these bases, remembering first that K and Na are one-handed, while Ca is two-handed.



AMMONIA, AN IMPORTANT BASE THAT FLIES ABOUT

These bases, or alkalies, are called *fixed*, just as we call certain oils fixed, because they do not give off gases, but stay where they are. There is, however, another very important base, or alkali, which is a gas and flies about, and so is called the *volatile* alkali, just as we call certain oils volatile. This base we already know, for it is ammonia.

And now I hope you will say that here is an exception to what was said as to the way in which bases, or alkalies, are made. For we said that these are compounds of metals, and if you remember the formula of ammonia, you will see that it has no metal in it. Its formula is NH₃. If we add the formula

of water to this, we get NH_4OH , which represents ammonia in water; and this substance is a true base, and acts like one. There is some reason to suppose that the combination of atoms NH_4 acts like a metal, and has something like the properties of a metal. Anyhow, this compound gives an alkaline reaction to litmus paper, and it acts chemically in precisely the same way as the fixed bases, such as KOH , NaOH , Ca(OH)_2 , and many others which might be named.

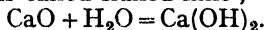
You will have noticed the way in which —OH turns up again and again in the formulas of these bases; and, indeed, —OH is such a common and important combination of atoms that it has been given the special name of hydroxyl. We find it in chemistry wherever we turn. And I want to show you that these various bases, or alkalies, really owe their —OH to the fact that they are combined with water. Let us start with slaked lime, as that is simple.

WHAT HAPPENS WHEN QUICK-LIME QUENCHES ITS THIRST

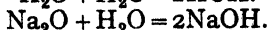
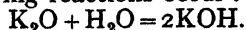
There is a compound called quick-lime, which really means *live* lime. It is called live lime because it acts so powerfully on things, as you soon find out if a speck of it gets into your eye. It is a white powder, and its formula is CaO . It is a very powerful base, formed by heating calcium carbonate, or chalk; thus



Now, when we add water to quick-lime, we are said to slake it, and the product is called slaked lime; thus—



This slaked lime, then, is an oxide which has combined with water, and the same is true of the other bases we have named. For instance, there is an oxide K_2O , the oxide of potassium; and another, Na_2O , the oxide of sodium. When water is added to these—and, indeed, there is no need to add water, for they take it from the air if they are exposed to it—the following reactions occur:



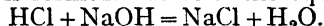
You will notice that these correspond exactly to what happens when quick-lime is “slaked”—that is, when it has its thirst satisfied—in the water; and when ammonia gas is added to water. So now we understand why these bases have

the —OH , or hydroxyl, in them, and we can easily remember that the proper chemical name for them is *hydroxides*.

And now we have to study a third great group of compounds, called salts; and the reason why we have kept their study to the last is that *a salt is made when an acid meets an alkali, or base*. In studying the acids we saw that, while every acid contains hydrogen, and no acid contains a metal, yet the hydrogen of an acid—or part of it—can always be replaced by a metal, forming a salt. We shall now see how this happens.

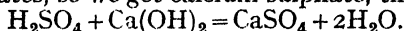
WHEN AN ACID MEETS AN ALKALI OR BASES A SALT IS MADE

Suppose we take some hydrochloric acid, HCl , and let it meet some caustic soda, NaOH . This is a very simple case. At once a powerful reaction happens, and a salt is formed. Here is the equation:



This means that we take an acid and a base, and we get a salt—in this case, the common salt, or sodium chloride, that we know so well. The hydrogen and oxygen of the acid and the base have combined to form water; and we get a solution of salt in water.

Now let us take another instance. Let us add slaked lime to sulphuric acid, and see what happens. We know that lime is a compound of calcium, and that salts formed from sulphuric acid are called sulphates, so we get calcium sulphate, thus:



SOME FAMILIAR FORMS OF SALT, AND HOW THEY ARE MADE

If you test this rather difficult equation, you will find that it is right. CaSO_4 is calcium sulphate, and water is formed as in the last case. But this time the salt is almost insoluble in water, and so we find a white mass of stuff, which is the salt. This salt occurs in nature in great masses of rock called gypsum or alabaster, and is very much prized for its beauty. Another form of it is called plaster of Paris, and occurs as a powder. If water is added to the powder it soon “sets,” and so we can use it for making casts, or images, of all sorts of things.

In these instances we see the way in which the hydrogen of an acid can always be replaced by a metal. The method is to bring a base to act upon the acid.

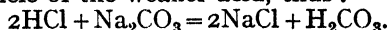
We see, too, that every salt consists

THREE KINDS OF COMPOUNDS

of two parts. It is a sort of double thing, having one part derived from an acid, and one part derived from an alkali, or base. These parts are called *radicles*, which means little roots. Thus the salt CaSO_4 consists of a basic radicle and an acid radicle, as we see when we look at it.

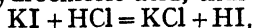
HOW A STRONG ACID WILL TURN A WEAK ACID OUT OF A SALT

And now we are to learn that different acids have varying degrees of power, and that a powerful acid will commonly turn out from a salt the acid radicle that goes to make it up, and will replace it by its own acid radicle. The strongest acids are those we began by mentioning—hydrochloric, sulphuric, and nitric acids; and among the weakest are prussic acid and carbonic acid. We call prussic acid weak because its salts can always be decomposed by other acids. Let us take an easy instance. If we act on sodium carbonate with hydrochloric acid, we find that the carbonate is decomposed, and the acid radicle of the stronger acid replaces the acid radicle of the weaker acid, thus:



We get sodium chloride again, and true carbonic acid. But instead of H_2CO_3 , we might have written $\text{H}_2\text{O} + \text{CO}_2$, for some of the carbon dioxide of the acid is given off to the air. In so doing it forms bubbles, or it *effervesces*, as we say; and we commonly know that we have been acting on a carbonate when we add an acid to a salt and find that bubbles are produced.

This will teach us that one of the easiest ways of making an acid is to take one of its salts and act upon it with a stronger acid, which turns it out and takes its place. For instance, if we want hydriodic acid, HI , we have only to take an iodide, such as KI , and act upon it with hydrochloric acid, thus:



which tells us that the iodide is decomposed, potassium chloride and hydriodic acid being formed.

THE VARYING STRENGTHS OF ACIDS AND BASES

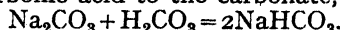
There are certain salts in which only part of the hydrogen of the acid is replaced by a metal. For instance, there is the perfect salt K_2SO_4 , potassium sulphate, in which the whole of the hydrogen of sulphuric acid has been replaced by

potassium; but there is also the salt KHSO_4 , in which only one of the hydrogen atoms has been replaced by potassium. We call these acid salts.

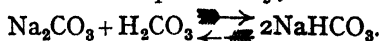
Acids and bases vary in their strength. If we have a salt made of a weak acid and a strong base, the salt will be really more basic than acid; and though it should be neutral to litmus paper, we find that it turns red litmus blue, just as if it were a base. Thus, sodium chloride is neutral to litmus paper, for it is composed of a very strong base and a very strong acid, and these balance one another. But if instead of sodium chloride we take sodium carbonate, Na_2CO_3 (which we usually call washing soda), we have a salt made of a strong base and a weak acid, and this salt turns red litmus blue. This case also illustrates for us what was said about cases where only half the hydrogen of an acid is replaced by a metal.

HOW SODA ILLUSTRATES A CHANGE ALWAYS GOING ON IN OUR BODIES

Just as we have KHSO_4 , so we have NaHCO_3 , and this is usually called sodium bi-carbonate, or baking soda. It is called bi-carbonate because from one point of view it contains twice as much carbonic acid as the carbonate; but that is really only another way of saying that it contains half as much sodium. The way to make it is to add another dose of carbonic acid to the carbonate, thus:



This reaction is one of the most important in the world, and is constantly happening in our blood as it runs in our tissues, and by this means the carbon dioxide they produce is picked up and carried to the lungs, where the equation works in the opposite direction, CO_2 and H_2O (that is, H_2CO_3) being given off by the lungs, and Na_2CO_3 being re-formed in the blood to do its work again. When a reaction, like this one, may work in both directions, we write it in a special way, thus:

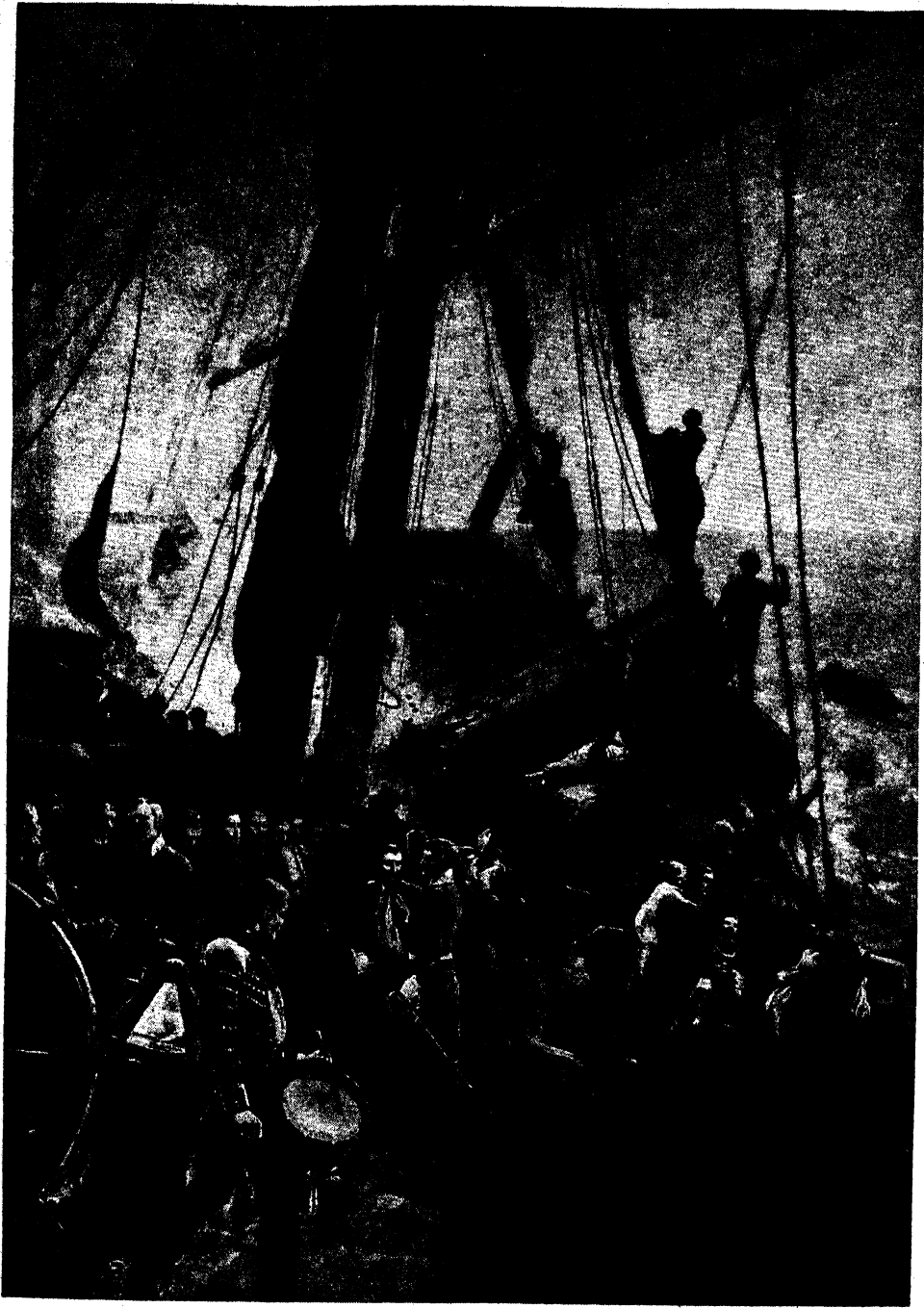


The arrows show us that the change may go in either direction, or is *reversible*.

Of all the millions of compounds we have only glanced at a few, but we now know what is meant by the words acid, base (or alkali), and salt, and what are the relations between these three kinds of compounds.

THE NEXT PART OF THIS IS ON PAGE 1867.

HOW THE BIRKENHEAD WENT DOWN



This powerful picture, by Thomas M. Hemy, brings before us vividly the scene on board the troopship Birkenhead, when it crashed into a sunken rock in Simon's Bay, South Africa, on a February night in 1852. The soldiers fell in as if on parade, and some were told off to help the sailors to assist the women and children into the boats. Thus 184 were saved, but there was no room for more, and, sooner than risk overcrowding the boats, 454 British soldiers and sailors stood in line and went down with the sinking ship. "Birkenhead" is inscribed on the flags of the regiments who thus met death so courageously.

This picture, illustrating the story on page 1820, is reproduced by permission of Messrs. Graves & Co., the publishers.



THE RACE FROM MARATHON

"REJOICE, we conquer!" Gasping out these words as joyfully as his parched tongue can utter them, a poor worn-out youth drops lifeless into the arms of those Athenians who have hurried out of their city to learn his tidings. His faint whisper goes from mouth to mouth, and is passed on throughout an anxious city, quickening the pulses of the citizens until they lose themselves in an outburst of thanksgiving and rejoicing.

The story of this victory is one of the most thrilling the world has ever known. It takes us back over 2000 years to one of the first decisive battles in the world's history. Darius, the Mede, has made himself master of Asia, and, angry at some interference on the part of some little Greek state, he assembles his picked soldiers, summons the various tribes who own his sway, and sails over the Ægean Sea to conquer and enthrall those little Greek states of whose skill in peace and war reports have reached him.

Athens is the first large city in the path of his hitherto unconquered hosts, and the Athenians feel the need of aid from the famous Spartans, whose state lay 120 miles to the south across the Isthmus of Corinth. The army of the Medes and Persians are fast approaching, and their city will soon be invested. How are the Spartans to arrive in time? The rulers of Athens, seated in grave council on the Acropolis, send for Pheidippides, their champion runner, who has won for his

CONTINUED FROM 1744



state the myrtle crown at the famous Olympic games held by the Greek states every five years. They command him to run and urge Sparta to come to their aid. And for two days and two nights Pheidippides runs, swimming the rivers and climbing the mountains in his path.

But the Spartans were envious and mistrustful of Athens. Though brave and fearless, they lacked intelligence; and, besides, they were a very superstitious people, and so Pheidippides was sent hurrying back with the news that their army would come, but could not start until the full moon.

Pheidippides races back to Athens again. The Athenians were now thrown on their own resources. The Persians had landed and the Athenians resolved to oppose them at once. The weary but dauntless Pheidippides takes his long spear and his heavy shield, and marches with the 10,000 picked men to meet the foe. We read elsewhere of the famous battle of Marathon and how these 10,000 Greeks drove back hundreds of thousands of Medes and Persians; this story is of Pheidippides.

Marathon was fought and won, and the victorious Greeks called to Pheidippides to take the news to the capital. He flung down his shield, and ran like fire the long twenty-six miles to Athens. There he fell and died, gasping as he fell into the arms of his friends the two Greek words which mean, "Rejoice, we conquer!"

THE MEN OF THE BIRKENHEAD

IT was not so very many years ago that the steamer Birkenhead was on her way from England to South Africa. On board of her were the crew and a number of soldiers, besides the wives and children of several of the soldiers; for they were not going out to a war, but to form part of the garrison of the country.

As the great ship steamed along the coast of Africa, no one dreaming of danger—it was night, and all but the sailors who had to work the ship were sleeping—her side crashed against a sunken rock. Everyone hurried on deck, for all knew from the shock that some great disaster had happened. But there was no panic. The officers gave their orders, and the men obeyed them as steadily as if they had been on the parade-ground. The soldiers were set to help the sailors, working at the pumps to keep the ship from sinking, and getting the horses overboard to lighten her. That must have been a sore task for men who loved the poor horses, but they could not be saved. And still the water came in, and everyone knew the Birkenhead must go down.

Then they set about launching the boats. The sea had not been dangerous for the big ship when she was whole, but it was too rough for small boats.

One big boat and two small ones were filled with women and children and pushed off safely; another was smashed by a falling spar; and two were swamped before anyone could be got into them. Then the ship herself broke in two, and one half began to sink.

The soldiers were already drawn up in ranks. The captain called to them to swim for the boats; but the colonel saw that if they did the boats would be over-filled and swamped. The men stood firm, awaiting their officer's order. He told them that if they swam for the boats, these would be capsized, and the women and children drowned.

So they stood in their lines, waiting for the ship to go down, as steady as if they were on the drill-ground. Then the hungry waves washed over the decks, and the brave soldiers were plunged into the sea. All they could hope for was to keep afloat till the boats reached the shore and could return to pick them up. A very few managed to swim ashore by themselves. A few held on to the wreck, and these were picked up next morning by a passing vessel which had also rescued the people in the boats who had been unable to reach the shore. But the greater number perished, heroes no less than if they had fallen on the field of battle.

THE SWISS GUARDS WHO DID THEIR DUTY

THE Swiss have often been noted for brave deeds, but one of those we like to think about most was done by Swiss soldiers far away from their own beautiful country, in Paris, in 1792, the year of the Revolution.

The French kings had learned to rely on the Swiss, and had formed a guard of honor of trusty yeomen from Lucerne and other cantons, and called it "Les Gardes du Roi."

When the mob stormed the Tuileries Palace, where the royal family were, on August 10th, 1792, the Swiss Guards stood firm defending King Louis XVI. and his queen, so that the men who were thirsting for their blood could only reach them over the bodies of the Swiss. One after another the soldiers were massacred, fighting bravely till two battalions were overcome, and when the rest fell, on September 2nd and 3rd, the Swiss Guards were almost wiped out.

The great Danish sculptor, Thorwaldsen, designed a beautiful memorial for the Swiss Guards, which has been sculptured out of the natural rock in the Glacier Garden at Lucerne. It represents a wounded lion pierced by a broken weapon, defending with its paw, as it lies dying, a shield bearing the fleur-de-lis of France. On the rock over the lion's head we read "Helvetiorum fidei ac virtuti," a Latin inscription which means "To the fidelity and courage of the Swiss." Then the names are given of those who were not false to the oath of fidelity—officers and men who fell not in defence of their own country, but simply in doing their duty to a foreign king.

If you ever go to Lucerne, be sure to see the lion, for it is a touching monument to loyalty, carved in the Alps of the men's native land. It is over a hundred years since they fell, but their memory is still dear in the land of their birth.

A BRAVE FERRY CAPTAIN

IT was a public holiday, and scores of tired workers, freed for a short time from office and workroom, were crowding the ferry-boats plying in all directions from the great city. For more than a week the heat had been intense, and people had dropped in the streets, where every breath of air seemed cut off by the high buildings. Beneath their feet the pavements were hot, and a subdued glare tired their eyes. Only on the water was the air cool, and there only were sights that could be borne with open eyes.

Soon, however, bent backs straightened, and pale cheeks flushed as a stiffish breeze, carrying a tang of salt, met the boat as she swung outwards into the bay. The passengers who had been almost silent at first began a merry chatter, and a band struck up on the upper deck. Accustomed as he was to his human load, Captain Jenkins felt a thrill of pleasure as the jaded faces grew less tired and gray. He was running on schedule or he would willingly have lengthened the trip for the precious refreshment that it gave.

The distance was only half-covered when a group of passengers called attention to smoke that was rising out of the woodwork surrounding the pilot-house.

The breeze was very strong, and the wood well seasoned and oily, so that the fire gained quickly. It seemed to come from beneath the floor of the hurricane deck, and Captain Jenkins quickly ordered some of the crew to chop through the walls of the pilot house and through the floor of the hurricane deck so as to get at the flames with water. In the meantime, the passengers, who numbered more than a hundred, gathered around and looked on with more interest than alarm. The sailors worked with a will and soon some of the woodwork was cut down, and buckets of water thrown on the flames. But it became evident that the fire instead of yielding was beginning to burn more briskly, and matters began to look very serious.

The ferry-boat was equipped with a line of hose, and this, at the captain's order, was trained on to the fire, and a message down to the engine room ordered a stream of water, pumped from the engines, to be directed upon the burning boards.

When it appeared that the fire was a serious matter, Captain Jenkins, who was at the wheel, turned on the boat's whistle full blast. The call for assistance was not made any too soon, for the flames were spreading in the direction of the wheelhouse. The passengers were as yet not gravely alarmed, but stood around seeming to regard the fire and the sailors' efforts to quell it as a spectacle got up for their benefit.

Captain Jenkins disliked to disturb their indifference, but his duty was clear, and very calmly he ordered the passengers to the stern of the boat, detailing such of the crew as were not fighting the fire to take measures to prevent panic. Then he telephoned the engineer to put on full speed.

One of the city fireboats heard the long drawn out whistle, and, recognizing the note of distress, made for the ferry-boat with all speed. A little tug, waiting for a new convoy and noticing the volume of smoke, steamed bravely to the assistance of the burning craft. The captain was finding it increasingly difficult to steer on account of the scorching heat when the two fire-fighting boats drew alongside. The ferry had now only five minutes run in order to make the landing, but clever steering was necessary to bring her into the slip.

Streams of water from the fireboat and the tug were thrown upon the burning pilot-house. The passengers, some of whom had already been wet by the ferry's hose, were caught under the new streams. Captain Jenkins, who had stood his ground in the face of the fire, and whose face and hands were already badly scorched, calmly stuck to the wheel again with two powerful streams breaking around him, and occasionally even on him.

Both of the fireboats, steering carefully, stayed at the side of the ferry as she moved to her landing. The blaze was not entirely out, but was well under control when at length the boat reached her pier amid the cheering of the many holiday-makers ashore. Then with the assistance of the additional hose it was quickly conquered. In spite of scorched hands and face, the captain personally supervised the safe landing of his passengers.

THE NEXT GOLDEN DEEDS ARE ON PAGE 1953.

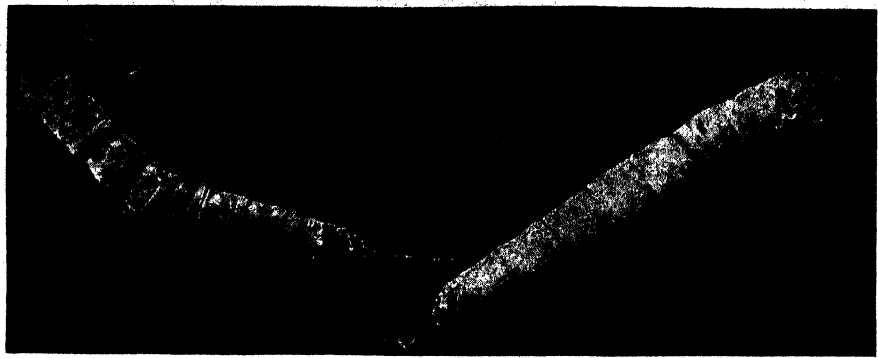
THE TREE THAT IS GROWN FOR AN INSECT



The heart-shaped leaves of the mulberry, that do not appear till May, provide good food for silkworms. Mulberry flowers grow in short, irregular catkins, and are not very attractive, but the fruit is pleasant.



The mulberry is not a native American tree, but has been introduced from the Far East. In the south of France, large plantations of mulberry-trees are grown to provide food for silkworms; and, last century, thousands of trees were planted in Ireland, in order to found a silk industry there, but this was not a success.



These two caterpillars of the silkworm moth, feeding upon mulberry leaves, are shown natural size.

THE WONDER OF A PIECE OF SILK

IF a boy had money enough, he would like to buy his mother, or his sister, a silk dress for her birthday. Very pleased she would be to have it. But if he said to her: "Here is a caterpillar gown for you," she would be horrified and call him a dreadful boy. Of course, a silk dress is not really a caterpillar dress, for that would mean that the dress was made of caterpillars. But though this is not the case, the material, if it be pure silk, comes entirely from the caterpillar, only we call the caterpillar in question a silkworm. That is merely a way we have. We call the silk-yielding caterpillar a silkworm, and we call the light-giving beetle of this country a fire-fly. Many things go by wrong names in common speech, and the result is that, when we study natural history, we are surprized to discover the true nature of the things we have so long misnamed.

The material of the silk dresses that our mothers and sisters are fortunate enough to have is made by a very ordinary-looking, big, fat caterpillar, and boys who keep caterpillars of this sort may, if they like, become silk merchants on a small scale. The silkworm is as much dependent upon man as is the canary in its cage. If all the tame silkworms in captivity were turned loose, the bulk of them

CONTINUED FROM 1764



SILK MOTH

would die. They depend upon us for their living, and we depend upon them for our silk. We can make lovely scents and sweets from coal-tar; we can make all sorts of things in the laboratory of the chemist, but not all the wisdom of man can make a piece of silk. How came man, then, to have these wonderful insects to

work for him, and how came they to depend upon man for their safety? It is a wonderful story, and takes us back to thousands of years before Jesus was born.

It was those wonderful people, the Chinese, who first discovered the use of silk. They learned that it could be woven into material for dresses, and they learned how to get it from the silkworm. They found that the caterpillar or the silkworm could be kept alive in captivity; that it would thrive as a prisoner, if it were kept clean, and fed on mulberry leaves, quite as well as if it were at liberty. So they kept the caterpillars, and when these turned into moths, they kept the eggs that they laid, and when the caterpillars spun cocoons of silk in which to live, they took a certain number of the cocoons and unwound the silk of which they were composed, and made the silk into dresses. What the Chinese were doing with caterpillars, nearly five thousand years ago, the people

in many countries are doing to-day, and all for the same purpose, that men and women may have silk to wear or to use for the thousand and one purposes for which this beautiful fabric is so much sought. Let us see what this wonderful process of Nature is that gives the world its silk.

FORTY THOUSAND EGGS THAT WEIGH ONLY AN OUNCE

We will suppose that we are setting up for ourselves as keepers of silkworms. The eggs—the only things that we need—can be bought, and we can set to work to gather silk this very summer. It is better fun even than keeping ants, for here we can see all that happens in the process. With how many eggs shall we start? A pound? No, nor an ounce. They are so light that there are about 40,000 eggs of the silk moth to the ounce, or about 100 to a grain. Of course, we must have a proper place in which to keep the eggs, a place in which we can be sure that the temperature will not fall below 62 degrees, nor rise higher than about 80 degrees. The heat may be increased as the time for hatching draws near, but it must never be more than 80 degrees. As a matter of fact, the lower the temperature, so long as it is not lower than 62 degrees, the stronger and better the caterpillars will be.

For this reason we must have a place where we can have a little artificial heat. A conservatory is a good place, but we must talk politely to the man who stokes the furnace, or he may let the fire get too hot or fall too low, and so spoil our chance. Of course, thousands of poor people have bred silkworms who could never afford a greenhouse. How did they manage? Many of them have put the eggs carefully in a bag and carried the bag tied round their necks so that the warmth of their bodies might hatch the eggs.

WHEN AND HOW TO HATCH THE SILK-WORM'S EGGS

With ordinary care there is no difficulty about hatching the eggs. But we must be ready for the day when they do hatch. First of all, we must be sure to have a supply of leaves of the mulberry-tree ready. It is of no use our hatching the eggs if this tree is not in leaf. The caterpillars would eat lettuce, but they would not be nearly so

fine, nor would their silk be worth much, after a diet of this sort. The next thing is to see that we have ready a very thin card, or piece of paper, pierced by little holes, which may rest on a ledge in the box, over the eggs. The little caterpillars, as soon as they are hatched, will see the light through these holes, and will crawl towards the light through them. In doing so, they will scrape off the shells clinging to them, and so escape all risk of being killed by being unable to free themselves from the shells. The caterpillar of other moths, as soon as he is born, makes a meal of his shell, but the silkworm needs this little help.

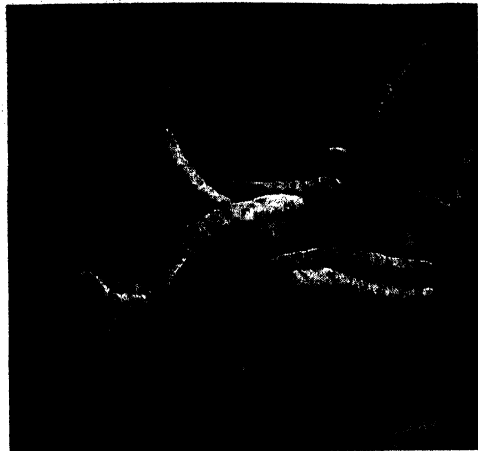
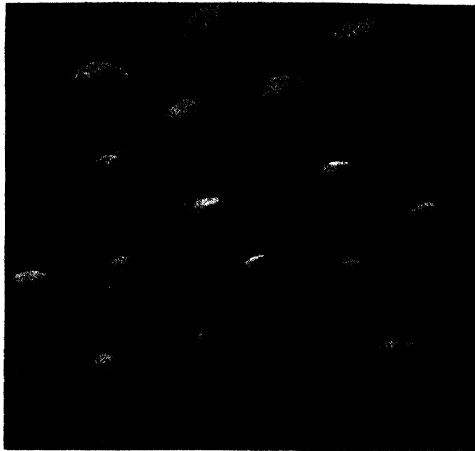
Now comes the first enjoyment of silkworm rearing. We can have a great many in a single big cardboard box, but we must be careful that this does not become crowded, or there will be trouble when the time for cocoon spinning comes. Better have three or four big boxes, like those in which the tailor sends home our suits of clothes, than that the silkworms should suffer for lack of sufficient space. It is a great convenience that we may safely leave the box open. We could not do this with any other caterpillars, for they would escape.

THE LITTLE SILKWORMS THAT WILL EAT A FOREST OF LEAVES

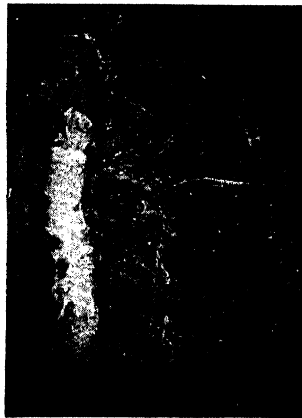
Not so the silkworm. It is as happy as can be in a box without a lid, provided that it has plenty of food, and that the box is perfectly clean. Keep down the heat to as near 62 degrees as possible, and the silkworms will grow big and strong. They eat a surprising quantity of mulberry leaves.

We are not going to have a whole ounce of eggs, with 40,000 silkworms hatching out; but, in order that we may get an idea of the appetites of these insects, we will suppose for a moment that we have got this number. During the eight weeks that they live in the caterpillar stage, the 40,000 silkworms will require over 1500 pounds of mulberry leaves. Of this quantity, some will be wasted, for we take out all dry and stale leaves. But there remain perhaps 1000 pounds to account for. That amount the caterpillars actually eat. We have to exercise care in the feeding, to distribute the food evenly, so that the caterpillars shall not have to struggle and fight for their meal. A good way

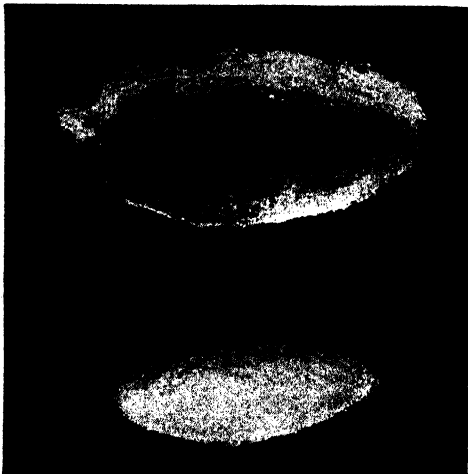
THE SILKWORM AND ITS GLOSSY CRADLE



The silkworm's eggs, here much magnified, are first bright yellow, and then become greenish grey. Some young silkworms feeding upon mulberry leaves, their principal food. They eat lettuce leaves also.



Having found a suitable place in which to spin its cocoon, or being provided by the silk farmer with a paper cone for this purpose, the worm spins its silken bed. These pictures show three stages of the work.



In this picture we see a completed cocoon resting among the twigs where it has been spun by the worm. Above is a completed cocoon, and below is one with the outside silk removed to show the inner silk.

is to cut up the leaves small, as this makes the distributing easier. The pace at which the caterpillars grow is surprising. Like other caterpillars, they have to moult—that is, to cast their skin. The skin in which they are born does not last all their lives.

HOW THE LITTLE SILKWORM CHANGES ITS SKIN AND GROWS BIG

When they are about six days old, they cease to feed. The skin splits down the back and the caterpillar crawls wearily forth, bearing his new skin about him. His appetite returns, and he eats more heartily than ever. He grows rapidly when the new skin is still soft. But, after a few more days, another new skin is required, and after that a third, and finally the fourth.

Each moulting time is a period of serious trial for the silkworms, and many die during its progress. Once the last moult is over, however, the caterpillar eats away as if it knew that its days for feeding were numbered. By this time it has become one of the biggest of all our caterpillars. Whereas it was at birth only a speck, weighing the hundredth part of a grain, it has now increased its weight to about 95 grains, and its length to three inches or thereabouts, which is a very rapid growth for two months. Now comes the most important time of the caterpillar's life. It has to become a chrysalis, and it is in order that it may safely pass through the chrysalis stage that it spins the famous silk.

All the time that the silkworm has been growing up, it has been forming and filling two large vessels, or sacs, that run along the sides of its body. In these two sacs is stored a sticky fluid. If we saw it in its natural state—that is to say, the state in which it is while still in the body of the caterpillar—we should not have the least idea as to what it was.

THE STICKY STREAM THAT BECOMES A STRAND OF GLOSSY SILK

That sticky stuff in the body of the caterpillar is to become the marvelous silk which makes the insect so valuable. When it is about to spin, as we call it, the caterpillar ceases to eat anything. As we watch, we see a tiny stream issue from its lower lip. That is the silk issuing from the spinnerets, or seripositors. It is as well that we should know the names, so that we may not have to puzzle when we meet them else-

where. We must remember, too, the scientific name of the silkworm. It is the *Bombyx mori*. Well, then, the *Bombyx mori* begins to spin its cocoon by producing a tiny stream of silk from its spinneret, or seripositor. The sticky fluid, if we force it from the body of the silkworm, becomes hard at once; but, manipulated by the silkworm, it is drawn out into a beautifully fine strand of silk. Strands from two sacs are joined together by the silkworm to form one thread, and it is only by the aid of the microscope that we are able to discover that there are two in the thread. With this material, the silkworm weaves itself the loveliest house of silk.

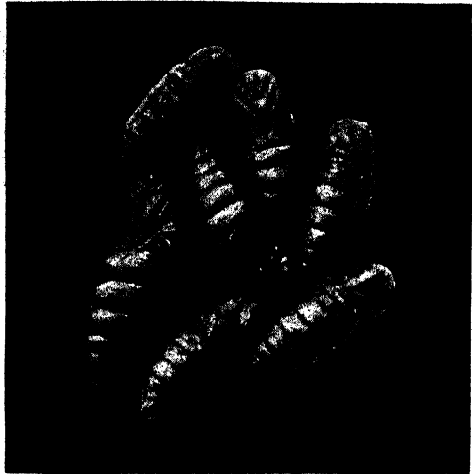
The work usually takes three days, but may take four, or even five. Little by little, the silkworm builds up its castle, weaving it so perfectly that at last the worm is entirely shut in and quite invisible. All the time that it is building, the silkworm works its head round and round in a regular order, never wearying. And all the time the silk never fails.

A DAINTY GLOBE OF SILK THAT LOOKS LIKE A FAIRY EGG

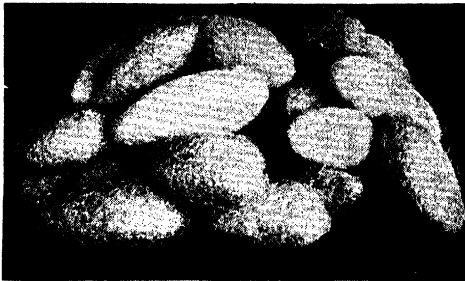
The silkworm, at the beginning of the task, weighs over 90 grains. When the labour is ended, the silkworm, with its cocoon, weighs only about 50 grains. And there it is in a lovely globe of tightly woven silk, looking like some fairy pigeon's egg. The cocoon may be either white or pale yellow. Having watched the spinning, we realize why we ought to be careful that the silkworms have plenty of space. If they are at all cramped, two will spin together only one cocoon, and this will be useless.

If we leave the cocoons alone, there will come forth, in about fifteen days or three weeks, a pretty moth from each. The average length of the moths is about half an inch, but the males are slightly smaller than the females. They can be kept on a cloth. They eat very little, and sometimes even nothing at all. They mate as birds mate. The females lay 500 or more eggs, and then die, and the males do not live long after them. Their whole lives as moths last but a few days. In that time, they never try to fly away. The females cannot fly at all; the males have just enough power in their wings to steady themselves in descending, but they cannot possibly fly upwards.

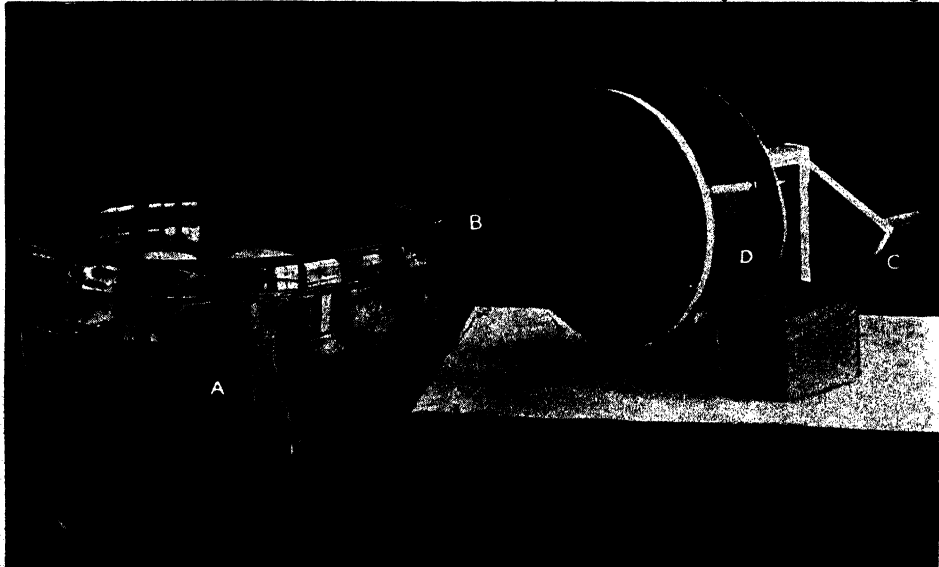
HOW THE SILKWORM GIVES ITS SILK



Having spun its cocoon, the silkworm, which is not really a worm at all, but the caterpillar of a moth, changes into a chrysalis, or pupa. On the left we see a cocoon cut open, showing the pupa, and the old skin of the caterpillar, and on the right is a number of pupae that have been removed from the cocoons.



The picture on the left shows some cocoons with the coarse outside silk, known as floss silk, removed. These cocoons are now ready to have their silk wound off into skeins, and we see a completed skein on the right.



The silk is wound into skeins by a very simple winder. The cocoon is placed in a vessel containing warm water, A, and the strands of silk, B, are wound round the drum, D, turned by the handle, C. The photographs on these pages are by Henry Irving and Percy Collins.

In this, we see the result of thousands of years of care and attention on the part of man. The *Bombyx mori* has always been the one species common everywhere as man's silk producer. Certainly, there are others in captivity in China and Japan, but they are not of much importance. At any rate, in America we have never been able to do much with them. There are wild silkworms, too, but their silk is of little use to men, so there has been no attempt to cultivate them. Those that have been allowed to remain wild can fly about as well as any other moths. Only those that have been cared for by man have given up the power to fly. If they could fly, they would fly away, and we should never know where to look for their silk.

So far, we have traced the silkworm from the egg to the caterpillar, and from the caterpillar to the moth. What of the silk, of which we have talked so much? Here we come face to face with a little tragedy. For every silk dress that is made means the death of thousands of silkworms.

WHY THE SILKWORM MUST DIE IN ORDER TO GIVE US SILK

That sounds dreadful, but it is not so in reality. The life of the silkworm, as a silkworm, is ended when the insect has reached the chrysalis stage. It is then in a state of torpor, and can have no sense of feeling, unless time and care are given to rousing its sleeping energies to a sort of wakefulness. That is not done. When the cocoons are all ready, we have to decide how many moths we want to renew our supplies of eggs. We take away those for the nursery. The others we want for silk.

These we plunge into scalding water. Manufacturers steam them, or submit them to a high dry heat. This kills the chrysalis. The reason why this has to be done is, that if life remained in the chrysalis, the latter would turn into a moth, and would then form an opening at one end of the cocoon out of which to creep, so spoiling the cocoon.

The next step is to wind the silk on to reels. To do this, the cocoon has first to be softened in water which is warm but not hot. The water dissolves the gum that binds the silk together. A neat-handed girl then twirls the cocoons about with a light brush, that catches the loose ends and causes them gradually to unwind. All that we

have to do is to undo the work that the caterpillar did. But the silk is far too fine to be wound in this state. In the thinnest part the silk is so fine that 2000 strands of it, laid side by side, may cover only an inch, while, in the thickest part, from 600 to 700 strands would be required to make up an inch in thickness.

SOMETHING THAT THE WISEST MAN CAN DO NO BETTER THAN A BOY

So, when the ends of the silk are discovered, the operator joins four or five together, passes them through a fine eye of glass, or polished metal, in a winding machine, and, letting the cocoons remain in the water, winds away until all the silk that can be used is wound out from each cocoon. The silk is wound on to a big wheel, and care has to be taken to see that the strands do not stick together. In Eastern lands, and in some parts of Europe, machinery so simple that a boy could make it is used; but in big factories they have much improved on this. Still, the principle is everywhere the same, and at this stage the wisest man in the world could do no better than any ordinary boy or girl who has had a little experience with the winding.

Once the silk is freed from the cocoon and wound on to wheels, or whatever they may be, it is ready for the manufacturer. Many processes follow. The silk has to be freed from all the gum remaining on it, for at present it has no lustre such as we expect silk to show. It has to be cleansed by boiling, to be scoured, and purified by acids. That is one way. Another is to let the silk begin its own purification by a process of fermentation, which is done by shutting up the uncleaned silk in tanks containing soapy water, in which it may lie for weeks. Then follow all sorts of washings, and finally a drying.

HOW THE TANGLED SILK IS COMBED STRAIGHT BY A WONDERFUL MACHINE

Then we have the silk clean, but terribly entangled. Wonderful machinery combs out the tangle, and makes all the strands of silk straight, and smooth, and even. Finally, the silk is ready to be made up into dress materials, or into whatever may be required, just as if it were wool or cotton. A garment of pure silk lasts a very long time, for there are very few things that wear better. Unfortunately,

manufacturers have discovered a way of adulterating it while the cleaning process is being carried out. They add salts of metals that are absorbed by the silk. This adds weight to the silk, and makes it appear a fine heavy fabric. But silk made by such dishonest methods soon rots. It is this adulteration that makes silk "cut" so readily, and makes a silk garment, or silk umbrella, become full of slits even when it is not much used.

HOW SOME EGGS GAVE EUROPE SILK FOR HUNDREDS OF YEARS

It is very wonderful to think that all the millions of silkworms that for many years produced the silk upon which England and the whole of Europe mainly depended came from the batch of eggs brought by two monks from China. This is the story. The art of making silk began, as we have seen, in China. The Chinese guarded their secret as closely as they could. They thought it good that their people should know how to make silk, but they did not want people in other countries to know how to do it. If other people wanted silk, they must buy it of the Chinese, not make it for themselves. They sold a good deal to Rome, for Rome in all her glory could not produce silk for herself. This state of things lasted until 550 years after the birth of Christ. Then the wise emperor, Justinian, who ruled in Constantinople, saw how important was the silk trade, and determined that he would create a trade in silk for the Roman Empire.

Two Persian monks, who had long lived in China, told him that they had seen the whole process of rearing the silkworms, and the manner of treating the silk. So he sent them secretly to China to get him some eggs of the silk moth. They walked all the way from Constantinople to China, and they walked back again, but they brought with them some of the precious eggs.

THE SILKWORM'S EGGS THAT CAME TO EUROPE IN A BAMBOO STICK

It would have cost them their lives had the purpose of their visit been known. They knew this, and were very careful. They got a supply of eggs of the silk moth, hid them in a hollow bamboo, and then carried them to Constantinople and presented them to the Roman emperor, who ruled in what is now the capital of Turkey. The

emperor was delighted. The eggs were hatched, and there appeared, for the first time in history, a number of silkworms in Europe. From each female moth he would get 500 or more silkworms, and from these in turn there would be another great increase. The monks had brought him, in the little bamboo nest of eggs, the richest gold-mine that they could have given him.

The emperor caused a silk factory to be set up in his royal palace. Only those whom he appointed were allowed to manufacture silk. But, in course of time, the eggs of the silk moths were carried to other countries. In Italy and France many towns became famous for their silk manufactures. Frenchmen, persecuted on account of their religion, fled to England, and took with them the secret of manufacturing silk, and after a while silk fabrics began to be made in England, where an important industry quickly grew up. They tried hard to cultivate silkworms in England and in Germany, but never succeeded sufficiently to supply the factories with cocoons. It has been tried also in our own Southern States, where great numbers of mulberry trees have been planted of the kind cultivated in southern France and Italy, which were originally brought from the Far East; but it has failed here too. Our extensive American manufactories of silk dress-goods, ribbons, etc., therefore have to depend, as do those in England, on raw silk imported from Europe, or from China and Japan.

About the year 1850 a terrible disease broke out among the silkworms of Italy and France. In spite of the disease, there were always some healthy caterpillars producing silk, and the trade never came to a standstill; but the damage done to that part of the trade which failed robbed France and Italy of hundreds of millions of dollars.

It was only then that Europe had to send again to the East for more eggs of the silk moth. For hundreds of years Europe had been stocked with its millions of silkworms from the descendants of those silkworms which came from the eggs carried away in a little bamboo by the two monks at the command of Emperor Justinian.

THE NEXT STORY OF NATURE IS ON PAGE 1893.

CROSSING THE SIERRA NEVADA



Though the Western mountains were high and rough, occasionally a low place called a gap or pass was found over which a crossing could be made though often with great difficulty. Here we see wagons crossing the Sierra Nevada Mountains, or rather going around the edge of them. Notice the straining oxen, and the men pushing with all their might to gain the top. Beyond we see a wagon train descending.

The Book of THE UNITED STATES

THE HISTORY OF THE UNITED STATES

IN this section we return to the story of our country. After the Constitution was adopted new states began to ask for admission to the Union. In this volume we trace the growth of our country in territory, population and wealth. You will find that the West of which we speak, has always been the country which lies beyond, and has meant different things at different times in our history. We tell how we secured Florida and the Oregon country, and how, after a short war, we gained from Mexico a great extent of land in the Southwest, including California, and thus extended our territory to the Pacific. We tell also of the rise of the Mormon power and of the discovery of gold in California, which drew people there like a fire-alarm, and of the dangers and difficulties which met those traveling across the plains in wagons or on foot, before the days of railroads. The conquest of the West is a stirring story—more thrilling than any drama.

THE GROWING WEST

THE West has meant quite different things at different times in our country's history. The region along the Connecticut River was the West to the founders of Plymouth and of Boston. The country around Pittsburgh was once the far West. Then Tennessee, Kentucky, Mississippi and Ohio became the West as population advanced. Next the country across the Mississippi was called the West, and not until later were the Rocky Mountains crossed.

All this means that the West has been the unsettled part of the country, where wild beasts and Indians were to be fought by the settlers as they moved on. Now farms and villages are seen in almost every part of the country and great cities have grown up, and are growing up, in every part of the Union. Soon the West will mean something entirely different. The buffalo has disappeared, the wolf, the bear, and the mountain lion are going, and in a few years there will be no more large tracts of land without inhabitants.

WHY THE EARLY SETTLERS MOVED WEST

In the early colonial days the land near the seashore was first taken. As more people came over they sometimes went further into the land, and sometimes bought the farms of the first settlers, who themselves moved. At

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CONTINUED FROM 1692

the time of the Revolution, only a narrow strip along the Atlantic, one hundred to three hundred miles wide, had been really settled, but already a few restless men had crossed over the Alleghany Mountains into the Mississippi Valley. If you will turn back to the map in the first volume you can see what that meant. From the northern part of New York state down to Georgia, the mountains stood like a wall to keep back the travelers.

But in spite of these mountains, the restless colonists made their way into the fertile river valleys beyond, and then moved on across the prairies. The Constitution gave Congress power to make new states whenever the population of a district or territory was thought to be large enough, and we shall see that new states have been made until there are now many more than the original thirteen. Let us see how and when some of these new states were admitted into the Union.

THE FIRST NEW STATE ADDED TO THE UNION

The first new state was not admitted in quite the same way as those that were made a little later. When Champlain, of whom you read in another place, came down from Canada to the lake which now bears his name, he looked at the beautiful mountains to the east and said, "Voila les verts monts!" "Behold the green moun-

tains!" So you see that Champlain named both the lake and the state, and the name of the state translated into English is Green Mountains.

This territory was claimed both by New Hampshire and New York, and both colonies sold the land to settlers, but New Hampshire sold more. When the King of England finally decided that New York had the better claim, the settlers, in 1777, declared that they would not submit to New York, but would make an independent state, to be called either New Connecticut or Vermont. This was during the Revolution, and New York could not enforce its claim. During the Revolution Ethan Allen, Seth Warner and others were active against the British. It was Ethan Allen, at the head of a band calling themselves "Green Mountain Boys," who captured Fort Ticonderoga, May 10, 1775, and gained military supplies much needed by the colonists.

After the Revolution the Vermonters tried to get the Congress to acknowledge them as independent. Congress did not wish to offend New York, and it was not until after the Constitution had been adopted that the new government listened to them. In 1790, New York agreed to give up all her claims on payment of \$30,000, and on March 4, 1791, Vermont took her place as the fourteenth state.

THE SCOTCH-IRISH AND GERMANS COME TO PENNSYLVANIA

Now let us turn to another part of the country. As we told you in another volume, not all the settlers in the colonies were English, though most of them came from the British Isles. Many came from the North of Ireland, and were sometimes called Scotch-Irish because the ancestors of many of them had gone from Scotland to Ireland. Many Germans also came. These people generally landed in Philadelphia, and went to Western Pennsylvania. So many came because of the wise laws made by Penn that the later comers found the best lands taken. Many of them moved southward into Virginia and the Carolinas.

Daniel Boone was born in Pennsylvania, but while still a boy, his family moved southward to the banks of the Yadkin River, in North Carolina. Boone grew up to be a mighty hunter, married, and built a cabin on the bank of the river. Recently some patriotic people have rebuilt the cabin and furnished it exactly

as it was in Boone's time, in order that the children of to-day can see how their ancestors lived. But Boone did not like farming. He liked much better to go on long hunting trips, sometimes lasting for days, or even weeks, during which he could kill deer, bears, panthers, squirrels and wild turkeys.

DANIEL BOONE AND OTHERS EXPLORE KENTUCKY

Boone heard from a white man, named John Finley, of a wonderful region over the western mountains which was a hunter's paradise. In 1769, Boone with five others crossed over into the country, which was sometimes called by the Indians the "dark and bloody ground," because different tribes of Indians had fought many battles there. It seems that few Indians lived there all the time, but many came to hunt. For six months the hunters wandered through the valleys and over the hills, sleeping under the stars or in caves. The other men returned to North Carolina, but Boone was joined by his brother and the two remained all winter in a little log cabin they had built. In the spring his brother returned to the settlements to get more ammunition and supplies and to guide any other hunters who might wish to come.

For three months Boone remained alone, two hundred miles from a white man, without a horse or a dog. Other hunters came, but in 1771 all returned to their homes in the East. But the story of what had been found beyond the mountains had spread all over Virginia and North Carolina, and many men wished to try their fortunes in the new land. Many things hindered them but, in 1774 and 1775, settlements were founded which were so strong that the Indians could not break them up, and after the Revolution settlers came rapidly. The territory was considered a part of Virginia until 1790, and on June 1, 1792, became the state of Kentucky, the fifteenth star on the flag.

SETTLERS CROSS THE MOUNTAINS INTO TENNESSEE

James Robertson was one of the men who went with Daniel Boone to Kentucky on one of his trips, but he liked the country on the banks of the Watauga River in what is now Tennessee better than that further west. He therefore led a party of North Carolina settlers there in 1770, but a few white men had

ETHAN ALLEN AND GENERAL HARRISON



You read in the text of the "Green Mountain Boys." Perhaps their most famous achievement was the capture of Fort Ticonderoga from the British, May 10, 1775, before the Revolution had really begun. Led by Ethan Allen, they surprised the post, arousing the commander from bed, and took it without the loss of a man. The military supplies captured were much needed, and were useful at Boston.



Tecumseh, or Tecumthe, as the name is sometimes spelled, was one of the most dreaded Indian chiefs. He was opposed by William Henry Harrison, then governor of Indiana Territory. In order to drive back the Americans, Tecumthe aided the British during the War of 1812, but was killed October 5, 1813, at the battle of the Thames. Some think he was the greatest Indian who ever opposed the Americans.

already built cabins in the region. They had to meet the same kind of hardships as the Kentucky settlers mentioned above, but brave men joined them. They made a sort of agreement known as the Watauga Association, but soon they were organized as Washington District and then as Washington County, North Carolina, as that state claimed the land to the Mississippi River. These settlers were brave and daring. A weak man had no place among them. When they heard that Major Ferguson was in North Carolina on the way to lay waste their territory, they hurried over the mountains to meet him. Joining other bands from Virginia, and North and South Carolina, they surrounded him at King's Mountain, as you may read in the story of the Revolution, and captured his force. Then they returned to their homes.

THE WESTERNERS ATTEMPT TO SET UP A STATE

As Congress had no money to pay its debts, at the close of the Revolution, it asked all the states holding western lands to give them to the general government. North Carolina agreed in 1784, but the settlers in the West did not like being transferred without their consent, and set up a new state for themselves, which was called the State of Franklin. As money was scarce they fixed the salaries of their officers at so many beaver and raccoon skins, and taxes could be paid in skins or produce.

When North Carolina heard of this, the act making the gift of the territory to Congress was at once repealed and the state began to try to regain control of the rebellious people. For a while the people held out, but they were not encouraged by Congress and soon the State of Franklin was no longer in existence. Again, in 1790, North Carolina surrendered the territory to the new government under the Constitution, and June 1, 1796, Tennessee was admitted to the Union as the sixteenth state.

The great body of land north of the Ohio River from which the states of Ohio, Indiana, Illinois, Michigan and Wisconsin have been made was claimed by Virginia under her charter. Parts were also claimed by Massachusetts and Connecticut. All these states claimed the land under their charters which had been given before anything was really known about America.

New York also claimed some of it. All of these states finally gave to Congress their claims in this Northwest Territory, as it was called. Congress decided to sell these lands at a very low price in order to get money to pay the debts of the Confederation.

THE NORTHWEST TERRITORY ALSO GAINS SETTLERS

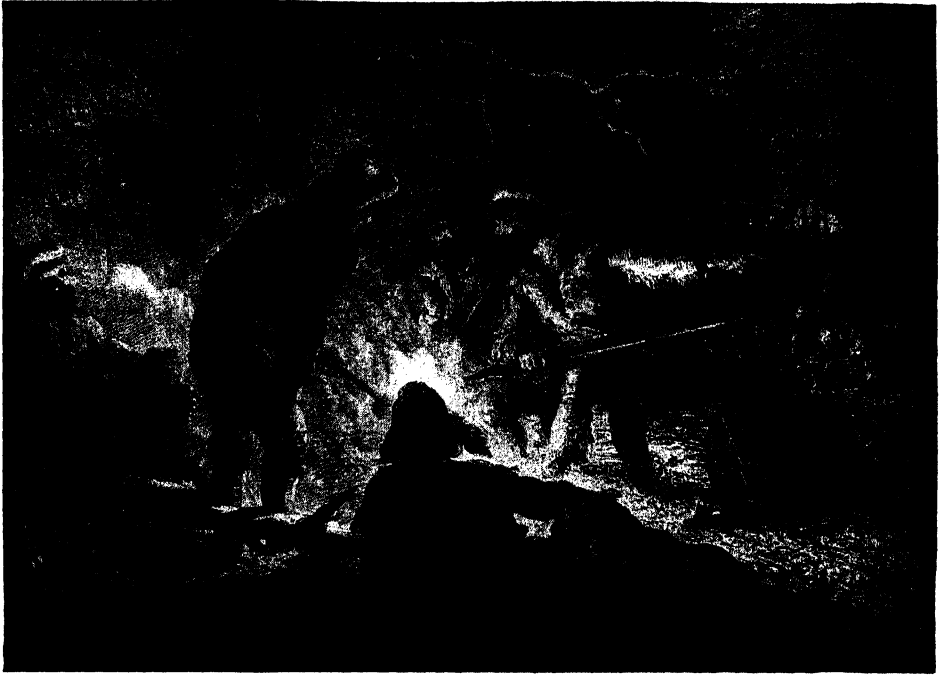
A company in which there were many Revolutionary soldiers, was formed to buy lands in this territory and settle a colony. In 1787 Congress passed an act selling five million acres of land and also making laws for the government of the territory. It was provided that not less than three nor more than five states should be made as the population increased, and that when any territory had 60,000 people it should be admitted into the Union. Slavery was never to be allowed.

At once people began to move into the territory. Many of them made their way to the Ohio River, built great flatboats, a picture of which we show you, and floated down. Early in 1788 Marietta, named in honor of Queen Marie Antoinette of France, was begun. This was the first settlement in what is now the state of Ohio. A few months later, Cincinnati (first called Losantiville) was begun.

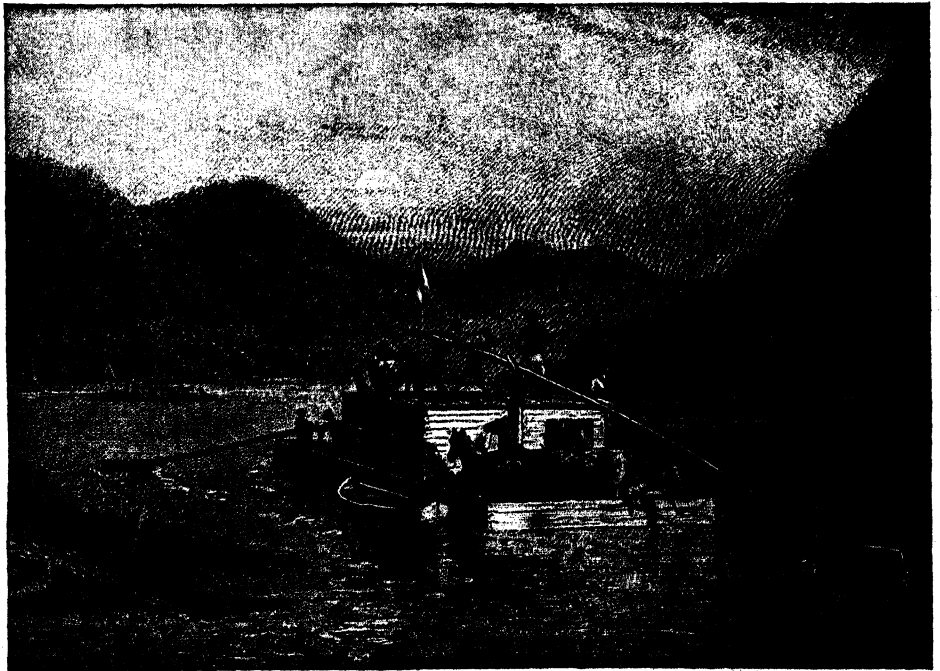
The companies advertised for settlers, saying that they had the richest and most beautiful country in the world. The land was the richest, the climate the best, and life was easiest in the Ohio country. Settlers came by the thousand, and the older states were alarmed. It seemed as if all their strongest young men were moving westward. So pamphlets were written in opposition, saying that the soil was not good, that the climate was cold, that the woods were full of Indians, panthers and terrible snakes, and that any man was a fool who would leave a comfortable home in the East and risk such dangers as he would meet in the West.

Part of both stories was true. Some of the land was good and some was bad. There were Indians and they troubled the settlers, and destroyed some small settlements. For a while the rush toward this part of the West was checked, but a few years later it began again and in 1803 (February 19th) Ohio was admitted as a state. Other states were soon to be made from the Northwest Territory.

LIFE IN THE WOODS AND ON THE RIVER



Here is a band of hunters and trappers in the wilderness with their rude hut in the background. Around the camp-fire they told the story of what had happened during the day. Perhaps the man on the log is telling how he killed the deer. They kept their rifles near for fear of Indians or wild beasts. Many men loved life in the woods so much that they could not live comfortably after settlers came.



When the West meant the country across the Alleghanies, a common way of going was to build or buy a flatboat, load upon it all the household goods and live stock, and then float down the Ohio River. This type of boat was called a "broadhorn" because of the two steering oars you see in the picture.

**DISPUTES WITH SPAIN IN THE SOUTH
CAUSE TROUBLE**

Now we have told of the territory in the North and in the middle of the country. What of that in the South? You remember that Great Britain kept Florida, which it had taken from Spain at the end of the French and Indian War. Twenty years later, in 1783, it was returned to Spain. The country then called Florida was divided into two parts. East Florida was almost the same as the present state, while West Florida stretched along the Gulf of Mexico to Louisiana, which was also owned by Spain. Georgia claimed all the territory westward to the Mississippi, but Congress said that it had been a part of West Florida and had been given up by Great Britain, and that Georgia had no rights at all. Settlers moved into the country in spite of the attempts of the Indians to prevent them, and, in 1798, Congress set up the territory of Mississippi.

**HARDSHIPS OF LIFE IN THE WESTERN
COUNTRY**

But after the settlers built their homes in these western forests, they found that all was not easy. It is true that game was plentiful, and that corn and wheat grew rapidly, so that it was easy to get food enough. Flax grew well and rough linen was manufactured by the women, and, since skins were plentiful, all could have clothes. They could not, however, make everything they needed, and they could get these things, which they could not produce themselves, only by trading their skins and furs or what they had grown on their farms. They could not very easily climb the mountains and take these things back to the old states. What could they do?

The easiest thing was to put them on a flatboat and float down the Mississippi with them. But Spain owned the land on both sides of the mouth of the Mississippi, and Spain was unfriendly to the United States. So every boat load that went to New Orleans was either captured or was forced to pay high duties. The United States was not strong enough to force Spain to allow the boats to pass freely and to trade with New Orleans or Mexico, and the western people grew angry. Some wished to fight and capture New Orleans. Others said that the western people ought to declare themselves independent of the United States and

make a treaty with Spain. A few even wished their country to become a province of Spain.

**THE EASTERN STATES TRY TO PRE-
VENT THEIR PEOPLE MOVING WEST**

All this trouble with Spain about the Mississippi was ended when that nation gave up Louisiana to France. You read on another page how we purchased it in 1803 and you were told how much the New England states opposed buying it. Soon a part of the territory asked to be made a state. There was great excitement in the East when this was first talked about, and much opposition. The eastern states had seen a large part of their population go to the cheap lands in the West. Some men said that unless Congress stopped making new states, the whole East would be deserted and ruined.

They also said that the Constitution did not give Congress power to make new states from any land which was not a part of the country when the Constitution was adopted. This was a new question and was very important, as less than half of the territory of the United States to-day was a part of the country in 1789. Some New England men threatened to secede. But in spite of their threats Louisiana became the eighteenth state in 1812, just before the second war with Great Britain began. Now there were seventeen states east of the Mississippi and one west of the great river.

We have already told of the War of 1812, and shall not say more about it now. After the war there was another great movement towards the West and Indiana was admitted into the Union in 1816; Mississippi came next in 1817, and these were shortly followed by Illinois in 1818, and Alabama in 1819. Many immigrants to the United States soon began to come, and it was not long until England was much troubled to find so many of her citizens coming to the United States.

**WE GET RID OF SPAIN BY BUYING
THE FLORIDAS**

The same year that Alabama came into the Union, Spain sold all her rights in Florida for \$5,000,000. Another trouble was ended. Spain had not governed the country well and bands of robbers, white, black and red, had done much damage to the people of Georgia and Alabama. The United States now was beginning to stretch across the continent. It con-

trolled all the land east of the Mississippi and south of Canada, and nearly as much beyond. There were now twenty-two states, and only four more have been made from the territory east of the great river. We shall learn of them soon.

You remember that James Madison was president while the War of 1812 was going on, and for several years afterward. When his two terms were over, another Virginian, James Monroe, became president, in 1817, and he also served two terms. A number of important things happened during these years. The most important for us to mention in our story of the West is what was called the Missouri Compromise. In order to understand it we must go back a little.

Before the Revolution all the colonies held slaves, both negro and Indian. It was soon found that the Indians were not reliable or industrious and so they were no longer held in slavery. It was also found that the negro slaves were not profitable in the North. The climate and the soil did not suit them very well, and so, about the time of the Revolution, the people there began to set them free, or else to sell them to the South.

FOR A TIME SLAVERY SEEMED TO BE DYING OUT

Some of the southern states did not find slavery profitable and at the time the Constitution was adopted, most people believed that the number of slaves would grow smaller and smaller, except in South Carolina and Georgia, where it was thought to be too hot for a white man to work in the rice fields. It was thought that perhaps a few would be kept for house servants, and that the others would gradually be set free.

A LITTLE INVENTION CHANGES THE HISTORY OF THE WORLD

All this was changed by an invention which has changed the whole history of the United States and of the world. At that time the summer clothing of the common people was chiefly coarse linen, while the wealthier wore finer linen or silk. Cotton cloth was very expensive. A small patch of cotton was grown upon almost every southern farm, but the great difficulty was to separate the fibre from the seeds. It was then done by hand, and we are told that it was the task of the slaves, and sometimes of the children of a family, to separate a shoeful of the cotton between supper and bedtime. A

whole day's work was only about four pounds. The process was so slow that little cotton was used at home and still less could be sold.

After the Revolution, Georgia presented a large tract of land to General Nathanael Greene on which he lived until his death in 1786. In 1792, Mrs. Greene was returning to her plantation, after a visit to relatives in New England, when she met on the boat a young man named Eli Whitney, who had just graduated at Yale College, and was on his way south to teach. When he reached Savannah, he found that the position, which he had expected, was no longer open and accepted Mrs. Greene's invitation to spend some time on her plantation, while looking for another opportunity.

One day a number of gentlemen dined with Mrs. Greene and discussed the need of a better way of separating the cotton. Young Whitney had shown skill in mending clocks and such things, and Mrs. Greene told the gentlemen that she believed Mr. Whitney could make a machine. Though he knew nothing about cotton, he at once set to work and early in 1793 produced a cotton gin which could do the work of a hundred slaves. Hundreds of others were built and cotton soon became cheaper than linen, and the demand increased very rapidly. Another man, Hogden Holmes, about the same time also invented a machine.

SLAVERY AT ONCE BEGINS TO GROW AGAIN

More and more land was planted in cotton, and more and more laborers were needed. Slavery had been dying out because there was not enough work that slaves could do, which paid the owners. The great increase in the cotton fields made it profitable to own slaves wherever cotton could be grown, and many more were brought from Africa. The southern states up to this time had grown many different kinds of crops and some of them had many small factories of different kinds. Afterward they grew more cotton than any other crop, and many of the little factories died out. In New England, where cotton could not be grown, factories to make goods to sell in the South increased in number and size.

After slavery had died out in the North, many people grew to believe that it was wrong to keep slaves, and wished to prevent any new states from having

them. The question came up in 1818 when Missouri asked to enter the Union as a slave state. Many people objected and the House of Representatives, in 1819, refused to agree to admit the new state, though the Senate was in favor of admission. Maine was now also asking admission as a free state. The House agreed, but the Senate refused to consent unless Missouri was admitted as a slave state. Finally it was agreed that both should be admitted, but that, in the future, slavery should not be allowed in any part of the Louisiana Purchase north of 36° 30', which was the southern boundary of Missouri. This is called the Missouri Compromise.

WHAT DID THE MISSOURI COMPROMISE MEAN?

A compromise is an agreement by which both parties agree to take less than they ask for, for the sake of peace. This compromise was not a good bargain for the slaveholding states. Missouri was added to the Union as a slave state, but the only part of the Louisiana Purchase south of the line, from which other slave states could be made, was what is now Arkansas and Oklahoma, while north of the line was the immense territory from which nine have been entirely or partly made. But the compromise brought peace for a while. Maine was admitted finally, March 15, 1820, but it was not until August 10, 1821, that Missouri became a state.

AN ELECTION WITH ONLY ONE CANDIDATE FOR PRESIDENT

Though the dispute occurred during Monroe's administration, it did not make any enemies for him. At the end of his first term, no candidate opposed him. He received the vote of every elector except one, who voted for John Quincy Adams, saying that no man except Washington should receive a unanimous election. The Federalist party was dead and only the Republican or the Democratic-Republican, as it was beginning to be called, was left, though all men did not have the same ideas.

Another important event of Monroe's administration was the announcement of what is known as the Monroe Doctrine. The Spanish colonies in South and Central America had rebelled and gained their independence, but Spain was hoping to get them back by force. In 1823, President Monroe sent a message to Con-

gress saying that the United States would object if any European power should attempt to take any part of North or South America. We would not interfere with the possessions they had then, but they must not try to get any more.

During Monroe's time a great public improvement which had great influence was built. This was the Erie Canal, which reached from the Hudson River at Albany to Lake Erie. It was begun in 1817 and finished in 1825. The man who had more to do with it than any other was De Witt Clinton, whose picture you will find on another page. The canal boats were pulled by horses and traveled very slowly, we should think, hardly more than three miles an hour. But a team of horses could pull a heavy load, many times as much as they could pull up the mountains.

THE ERIE CANAL CAUSES A GREAT INCREASE IN WEALTH

The effect was wonderful. Before this time it cost about \$120 a ton or six cents a pound to carry goods from New York to Lake Erie. Soon the rate fell by way of the canal to less than a cent a pound. The canal boats carried passengers also. Before the canal was built New York City was growing very slowly. We are told that between 1810 and 1816, the population increased only thirty-six hundred. Between 1820 and 1830, the population increased nearly sixty thousand, and continued to increase. The New York merchants grew wealthy selling goods to the West, and the people in that region were delighted to be able to get goods out of or into their country so cheaply. The rush toward the West began again, and soon Michigan Territory, from which the states of Michigan and Wisconsin were made later, gained many settlers.

MASSACHUSETTS AND VIRGINIA FURNISH THE PRESIDENTS

The next president after Monroe was John Quincy Adams, whose father had been president before him. He had great faith in the growth of the United States and wanted to gain more territory than we then had. He was in favor of taking Canada, buying Texas, annexing Cuba and of extending the United States to the Pacific. He believed that some day all this territory would be needed, but he was a man who made more enemies than friends and could not get Congress to act

SCENES IN WESTERN LIFE



Before the days of railroads in the West, judges and lawyers traveled from courthouse to courthouse on horseback, as the roads were too rough and too narrow for carriages, and there were few bridges across the streams. When Abraham Lincoln was a struggling young lawyer in Illinois he traveled like the party you see in the picture, and amused his companions by his stories.



When the Mormons were driven out of Illinois, and Joseph Smith, the founder of the sect, was killed, Brigham Young, the new leader, went in search of a new home. Far beyond the inhabited region he came upon the Great Salt Lake and there determined to found a new state where his people would not be disturbed. This was the beginning of what is now the state of Utah, where there are still many Mormons.

as he wished. One reason was that the people of the new states said that they were tired of having the president chosen from Massachusetts and Virginia. At the end of Adams's term, the Constitution had been in operation forty years. During that time Virginians had been president thirty-two years and Massachusetts men eight.

Therefore at the election in 1828, Adams was badly defeated by Andrew Jackson, the hero of New Orleans. Though Jackson was born in North Carolina, he had removed when a young man to Tennessee, then considered a part of the West, and became very popular with the people across the mountains. The common people thought of him as one of themselves. The other presidents had been men of education and the Westerners called them aristocrats. Jackson had been born poor, and had little education. He had endured the hardships of life on the frontier, and had been a famous Indian fighter, and knew what the people of the West wanted. His election meant that what Europe thought or said would have less influence than it had had before.

JACKSON, THE WESTERN MAN, BECOMES PRESIDENT

So many interesting things happened during the eight years Jackson was president, that we can tell only a few. The trouble about the United States Bank is very hard for young people to understand, and we can only say that Jackson had his way and destroyed it. South Carolina felt that many of the laws made by Congress to help the manufacturers of New England were unconstitutional and unjust, and declared that she would refuse to obey, or "nullify" them. But though Jackson had been born in the South, he said that the Union must be preserved, and that if necessary he would send troops to make South Carolina obey.

This attempt of South Carolina to nullify the laws of Congress showed that the South was getting restless and some wise men began to fear the trouble which later brought about the Civil War. The South felt that it must have new territory, but it was not sure where it could get it. No new states had been admitted for fifteen years at the time Arkansas came as a slave state (June 15, 1836), balanced by Michigan (January 26, 1837). What is now Oklahoma had been taken for the Indians, who were made to

move from Georgia and Florida. Except Florida there was no more territory in which slavery was permitted.

HOW TEXAS GAINED HER INDEPENDENCE

The country along the Gulf of Mexico, beyond the United States possessions was called Texas by the Spanish and Mexicans. Americans began to move into this region about 1819, and very soon large numbers had arrived. Both Adams and Jackson tried to buy the territory but Mexico, which had gained her independence from Spain, refused to sell. The Texans began to talk about independence, and in 1835, fighting began. The Texans soon showed that they were better fighters than the Mexicans, organized the Republic of Texas, and asked to be admitted to the United States. Many northern men opposed taking Texas, because they feared that it would give so much more slave territory. We shall hear more of Texas a little later.

During Jackson's term of office the first railroads were built in the United States, anthracite coal was used in an engine, a reaping machine was invented, and many other important inventions began to come into use.

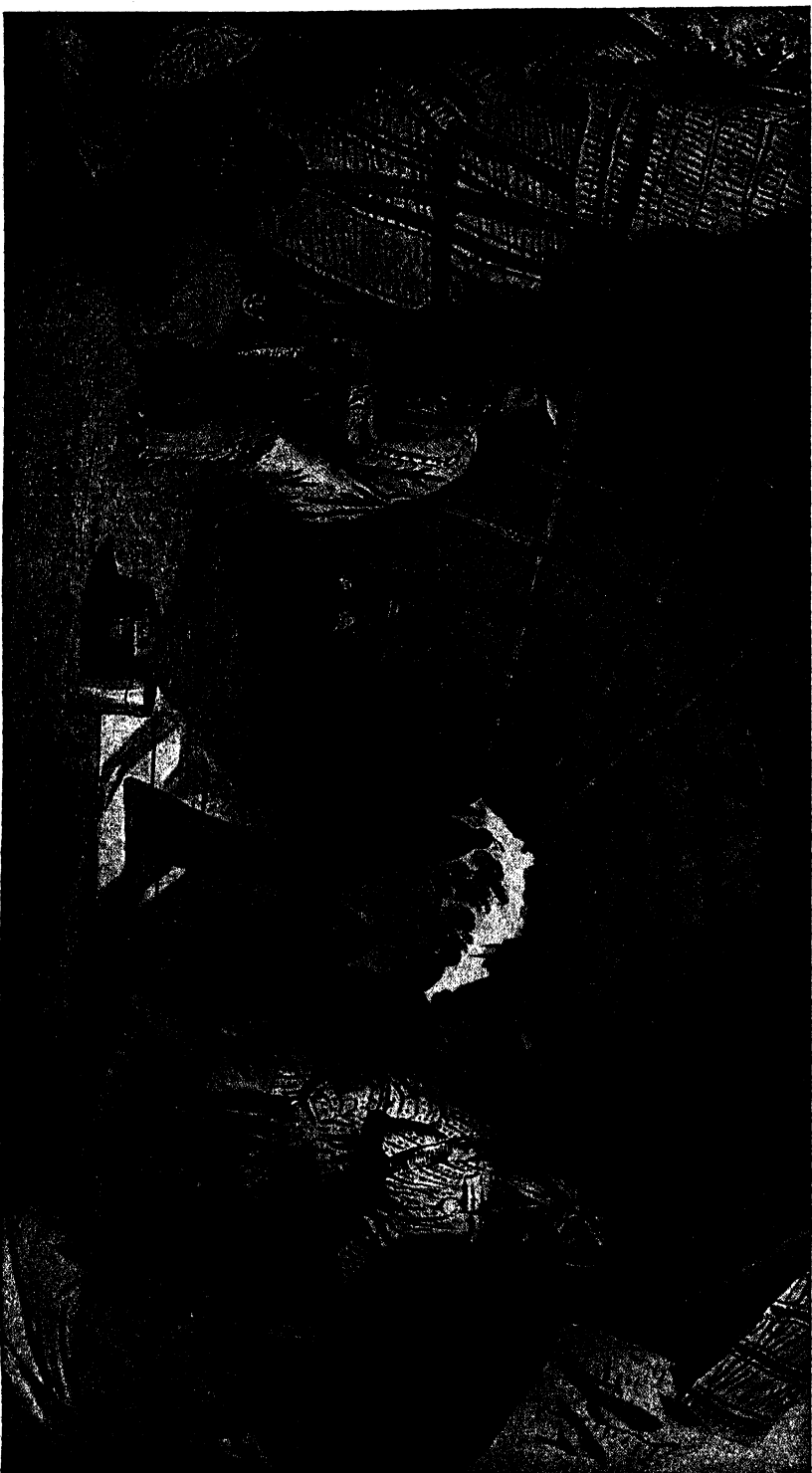
After Jackson came Martin Van Buren. His administration was unfortunate, as times were very hard, especially in the West, where nearly every man was buying or selling land. The people then believed that every little village would some day be a great city, and everybody speculated in land. Some of these villages have since grown into cities, but all could not grow at once.

A NEW PARTY ELECTS A PRESIDENT WHO SOON DIES

Van Buren was given only one term and was followed by William Henry Harrison, a soldier of the War of 1812 and a famous Indian fighter. The party which had elected him had grown up during Jackson's time and its members were called Whigs. President Harrison died only a month after he became president and the vice-president, John Tyler, of Virginia, succeeded him, but he spent most of the time that he was president quarreling with Congress.

All this time daring explorers and settlers were going further and further west. The American Fur Company had opened a road to the Oregon country. Captain Bonneville, in 1832, discovered the Great

THE MEDICINE DANCE OF THE WINNEBAGO INDIANS



You read something of the "medicine men" on page 18 of our book, and there learned of the powers they were supposed to exercise over the evil spirits, which brought sickness and other forms of bad luck. Here we see the "medicine dance" of the Winnebago Indians, who are a branch of the great Dakota family, which is more commonly called the Sioux. The original picture was drawn by an officer of the United States Army, who had spent much time among them. The Winnebagoes have always opposed us. They fought for the French during the French and Indian War, and for the English during the Revolution and the War of 1812.

Salt Lake, and missionaries to the Indians settled in Oregon a little later.

John C. Fremont, a young army officer, made three trips to explore the Rocky Mountain country in 1842, 1843 and 1845. He had good guides and traveled over a large part of the country, but hardly deserved the name of "Pathfinder of the Rockies," which his friends gave him.

President Tyler greatly favored annexing, that is, joining Texas to the United States, and in spite of the opposition of those who opposed slavery, succeeded just before the end of his term. Texas became a state, with the right to be divided into five states later if it desired. But the Texans have been so proud of the size of their state that they have never wished it to be divided.

PRESIDENT POLK WISHES TO EXTEND OUR TERRITORY

The next president, James K. Polk, of Tennessee, not only wished to add Texas, but California besides. He was determined also to settle the Oregon question in some way. Just what Oregon was nobody knew exactly. The name was given to the country along the Pacific Coast, north of California which belonged to Mexico. The coast had been explored by Spaniards, Englishmen, Americans, and Russians, but for many years there were no permanent settlements.

In 1819 Spain had agreed that she would not claim any territory north of what is now California. Five years later Russia agreed that it would claim nothing south of 54° 40'. This left a large stretch of territory along the Pacific Ocean claimed both by Great Britain and the United States. As it was considered worthless except for furs, it had been agreed several years before, that both nations might settle or hunt in the country until an agreement should be made.

"FIFTY-FOUR FORTY OR FIGHT" AND THE OREGON COUNTRY

Missionaries and scattered settlers made their way into the region, and sent word that there was excellent land and that the United States ought to have the country. Soon there were several small settlements. The British had no settlements except the forts to protect the fur traders. Great Britain was quite willing to make the Columbia River the boundary line, but this would have given her nearly all of what is now the state of

Washington. The Americans demanded all of the country up to the Russian line of 54° 40', and a popular saying in 1844 was, "Fifty-four Forty or Fight," meaning that if Great Britain would not give up all the Oregon country up to 54° 40', we would fight for it. But this would have cut Canada off from the Pacific Ocean and Great Britain would not agree. During Polk's administration, by a compromise the boundary line was fixed where it now stands. Great Britain took what is now British Columbia and another large addition was made to our territory.

WAR WITH MEXICO OVER TEXAS FINALLY BEGINS

Mexico had never acknowledged the independence of Texas and had threatened the United States. When Polk sent a man to try to buy California, the Mexicans would not listen to him. Besides Mexico said that some of the land claimed by Texas as a part of that country had never been so called and that she would never give it up. So President Polk ordered General Zachary Taylor to advance into the disputed territory and close the Rio Grande (Great River). Soon a body of Mexicans (April 24, 1846) attacked a small part of his force. The President declared that Mexico had begun war against the United States and on May 13, 1846, Congress declared war against Mexico.

SOME NORTHERN MEN OPPOSE THE WAR WITH MEXICO

Not every one was in favor of the War with Mexico. New Englanders generally opposed the war, saying that they did not wish to help the South gain more territory for slavery. Therefore very few men in the army that was raised came from the northern states, but the South was enthusiastic and many volunteers offered themselves for the war. The two chief commanders, Scott and Taylor, were also southern men and so it was called a southern war. New England has generally opposed adding new territory to the Union. You remember how the Louisiana Purchase caused the New England men to threaten to secede. As soon as war was declared, General Taylor was ready to advance.

GENERAL TAYLOR'S INVINCIBLE ARMY ADVANCES

Now a series of battles began in which the American arms were always success-

A BUFFALO HUNT IN THE WEST SIXTY YEARS AGO



The early settlers found a few buffalo, or bison as they are more properly called, east of the Alleghany Mountains, but across the Mississippi, millions were found. They roamed the plains in great herds, sometimes numbering several thousand. The Indians captured them by driving them over cliffs, or into deep snow, or by attacking them on horseback as shown in the picture, which was made from a painting. The white man with his gun was a more dangerous enemy and thousands were slaughtered for their hides or for their tongues, and left for the wolves. Now there are only a few left, most of them in zoological gardens.

ful. At Palo Alto General Taylor defeated a larger force of Mexicans on May 8, 1846, again defeated the same troops at Resaca de la Palma the next day, and then crossed the Rio Grande in pursuit of the flying Mexicans. On September 24th, Monterey was captured, though defended by a larger force than the attacking party. A large part of General Taylor's army was then sent to join General Scott, of whom you read on page 1399, who was ordered to land at Vera Cruz on the coast and capture Mexico City.

The Mexican general, Santa Anna, knew of the departure of these soldiers, and hoped to defeat Taylor's little army before marching to meet General Scott. Therefore, with 20,000 men, he attacked the little American army of 5,000 men at Buena Vista on February 23, 1847, but was badly defeated. It seemed that Taylor's army could not be beaten.

While General Taylor was marching into Mexico, General Kearny, who had been sent into New Mexico, captured Santa Fé, without firing a gun, and then turned to aid in the capture of California, but found that Fremont had already aided the Americans living in the territory to take possession of the country.

GENERAL SCOTT IS AS SUCCESSFUL
AS GENERAL TAYLOR

Meanwhile General Scott landed at Vera Cruz in March, took the city, and defeated Santa Anna at Cerro Gordo in April. When the march on Mexico City began in earnest, another series of brilliant victories began. Contreras was taken on August 20th, Churubusco the same day, and in September, the castle of Chapultepec, which was a part of the defences of Mexico City, was taken by storm though bravely defended. On September 14th the victorious army entered the city which Cortes had taken more than three hundred years before. The American forces had been wonderfully successful.

Mexico was now helpless and was forced to make peace. All claim to Texas was given up, and in return for the sum of \$15,000,000, California and what was called New Mexico were also unwillingly surrendered. From this territory have been made the states of California, Nevada and Utah, and parts of Colorado, New Mexico and Arizona. Five years later another strip of land, south of the two last named, was purchased for \$10,-

000,000 and the territory of the United States proper became the same that it is to-day.

THE NEW RELIGION JOSEPH SMITH
PREACHED

But would this wide country ever be filled? It is not all thickly settled yet, but while the Mexican War was going on a settlement was made in Utah which is very interesting. In 1830, Joseph Smith, a farmer living in New York State, published a book which he said was the translation of a book written in strange letters, on golden plates. He declared that an angel had shown him where these plates were buried in the earth. The book said that the American Indians were descended from the lost tribes of the Jews and told of the mighty deeds of Mormon, who was a pious Christian and a great warrior.

A Mormon church was set up in Fayette, New York, but soon moved to Ohio, and then to Missouri. The Mormons were driven out of Missouri, and, in 1840, founded the city of Nauvoo in Illinois, which soon had 12,000 inhabitants. Joseph Smith had entire control in all things, and soon the people of the country began to say that the Mormons were a danger to the state. It was feared that the city would be attacked by a mob and Joseph Smith and his brother were both killed in 1844.

THE MORMONS ATTEMPT TO MOVE
OUT OF THE UNITED STATES

The Mormons still held to their belief, in spite of persecution, and determined to move westward, where there were no people to trouble them. In 1847 a party reached the Great Salt Lake, which was then in Mexican territory. Here they set up a government, and brought all the other members out. Many converts were made in the East and in Europe and their settlement grew rapidly. They brought water from the hills to irrigate their fields and raised large crops, which they sold at good prices to travelers on the way to California.

Soon the leaders began to preach polygamy, that is, that it was right for a man to have more than one wife. It was believed that the Mormons were intending to build up an independent state which should not be subject to the laws of the United States but only to the officers of the church, and in 1857 a small army was sent out to keep order, but no

AMERICAN LEADERS IN THE MEXICAN WAR



During the whole of the Mexican War our troops seemed always successful. Monterey was well fortified and was defended by a force larger than General Taylor's, but was soon taken. General Taylor's horse "Whitey" was as well known to the army as his owner, and both seemed to enjoy being under fire. At Resaca de la Palma and later at Buena Vista the result was the same.



General Winfield Scott at the head of 12,000 men landed at Vera Cruz, on the Gulf of Mexico, in March, 1847, soon captured the city, and started on the toilsome march into the interior. Finally, after several battles in which his troops behaved like veterans, instead of untrained militia, the capital was taken, September 14th, and the army entered the city of Mexico, which Cortes had taken three hundred years before.

fighting occurred. Many Mormon missionaries were sent to eastern states and to Europe, and thousands of converts moved to Utah. Many walked all the way from the Missouri River to Salt Lake City as the few wagons were needed to carry the baggage and provisions, as much of the country through which they passed had few or no inhabitants. This was a journey of three months, and hundreds perished on the way.

In spite of the presence of the army the Mormons kept up their practices. During the Civil War they were left very much alone, and not until they wished the territory of Utah to be made a state did they declare that they would give up polygamy. Many other charges were made against the Mormons, but they were never entirely proved.

GOLD IS DISCOVERED IN CALIFORNIA

While this community was growing up other settlements of a different sort were growing up further west. Early in 1848, just before the treaty of peace with Mexico was signed, gold was found in California. The news spread rapidly and the little towns in the West were deserted while the inhabitants dug for gold. When the news reached the East, thousands of farmers left their ploughs, mechanics dropped their tools, clerks and professional men left their desks to seek their fortunes in the gold-fields. Some made the long journey in sailing vessels around Cape Horn, others crossed the Isthmus of Panama, and then made their way north, others took the long, dangerous trip across the plains, suffering much from hunger, thirst, and the attacks of Indians.

The population of California was small when it came under American rule. Though it had been visited by Sir Francis Drake, and had been explored by Spaniards from Mexico, about 1600, few settlers had gone until after the establishment of the missions to the Indians. Father Junipero Serra with some Franciscan friars began in 1769, and before 1823, twenty-one missions and two chapels had been established. Several important California cities and towns have grown up on the sites of the old missions. Among them are San Francisco, Santa Barbara, and San Diego. Many Indians were converted and taught some of the arts of civilization. Following the friars

a few Spaniards or Mexicans established great cattle ranches. The property of the missions had been confiscated by the government, after Mexico revolted from Spain, but few settlers had come.

During 1849 nearly 100,000 people poured into California, drawn by the stories that many miners were finding gold worth several thousand dollars every month. Towns sprang up in a night in districts where gold was found. Many of the newcomers were honest men, but many gamblers and ruffians also came, and robberies and murders were frequent. As the country grew so rapidly there were not enough officers to keep order, and so the better men organized what they called "Vigilance Committees" which tried men accused of crimes and punished them if found guilty. When satisfactory courts and laws were established the Vigilance Committees no longer met.

Soon the population of California was large enough to become a state but again the dispute arose as to whether it should be slave or free. The Missouri Compromise line crossed it and both North and South claimed it. The people of the state however wished it admitted as a free state and this was done by the Compromise of 1850.

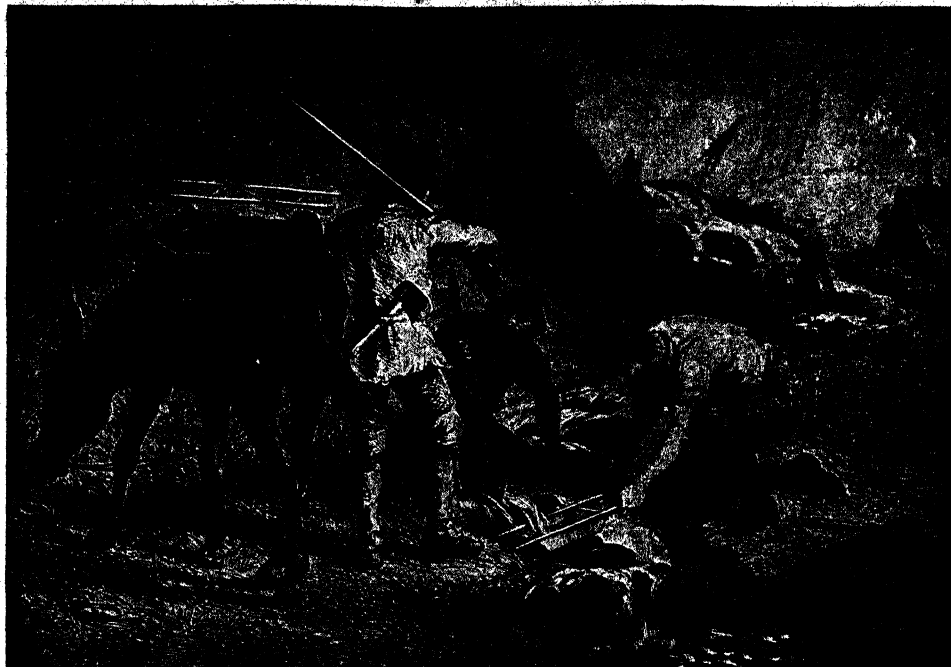
A SIMILAR RUSH TO THE GOLD-FIELDS A HALF CENTURY LATER

All of you have heard of the Klondike, and know of a rush very much like this one to California when gold was discovered in Alaska. Very much the same sorts of things happened in Alaska which happened in California about fifty years before. When you come to read of Alaska in another place you can understand California better. A visitor to that state now finds it very hard to believe what he reads about the days of "forty-nine," that is, the year 1849, during which there was the greatest excitement.

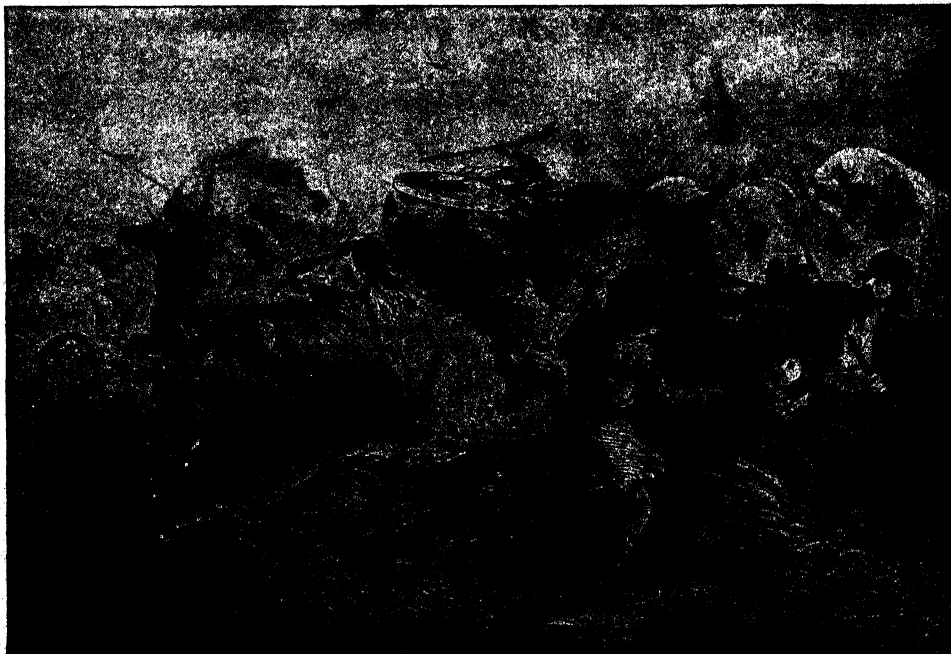
STATES ADMITTED TO THE UNION AFTER TEXAS

Now let us see what states were admitted to the Union after Texas. Iowa was the first, in December, 1846, followed by Wisconsin in May, 1848, both as free states. Then came California in September, 1850, also free. There was little more slave territory out of which to make states. So, in May, 1858, Minnesota, and in February, 1859, Oregon, came in as free states. The South made a strong effort to have Kansas made a slave state

WASHING GOLD AND FIGHTING INDIANS



Much of the gold in California in the early days came from the beds of streams. Prospectors roamed the country examining every brook. The man is shaking the box, in which a shovelful of sand has been placed. The gold is heavier than the sand and sinks to the bottom, while the sand and soil are washed away. This is called placer mining, and any man could do it, as no expensive tools or machinery were required. At the present time most of the world's gold is obtained from deep mines.



While bands of travelers or settlers were crossing the plains in wagons, they were sometimes attacked by Indians, who attempted to drive off their cattle if they could not capture the wagons. When we think of the dangers and the hardships of pioneer days in the West, we wonder that any were brave enough to risk crossing the plains. Perhaps your grandfather can remember these days.

but failed, and in January, 1861, just before the Civil War began, Kansas became a free state. We shall tell you more about the struggle for Kansas in our next story, which will tell also how the South, finding it could not keep the number of slave states equal to the free states, tried to leave the Union.

Now let us look back over the growth of the West. We saw that Vermont, Kentucky, Tennessee and Ohio were once western states, that the Louisiana Purchase made the land beyond the Missis-

sippi the mountains so that the people may preserve the water of the melting snow and use it as it is needed instead of allowing it to run away in waste.

HARDSHIPS OF LIFE ON THE PLAINS

Into the land beyond the Mississippi, the people went, suffering many hardships and risking their lives in many ways. Beside the great roads, which the wagons followed, were seen the bones of horses, oxen and men who had died on the way from hunger and thirst, from exhaustion,



This is the Santa Barbara Mission on the edge of the city of Santa Barbara. Most of the missions are now in ruins, but this is well preserved, and services are still held here. Along the walk beyond the arches the good friars walked and taught the Indians. The chapel is at the right of the picture.

sippi the West. Then we gained two other great pieces of territory which carried our country to the Pacific. One of them, called Oregon, we gained by discovery, exploration and settlement; the other, the Mexican territory, by conquest and purchase.

Much of this territory seemed useless at the time we got it. Few people thought that the Oregon country was really worth having, and much of the Mexican territory has remained a desert to the present day. We are just learning, however, that much of the soil needs only water to make it very fertile. Therefore, the government is building dams in

or from the attacks of Indians. Some of the land they crossed seemed a hopeless desert then, though it is now being made fertile by bringing water to it.

These Western pioneers and their descendants wrested the land from the wild beasts and the Indians, and have made a civilized country of it. Where a few thousand Indians once lived there are now many millions of people. Broad ranches, fertile farms and great cities now occupy the country where buffalo herds made the only roads there were. Of course, the railroads have had much to do with this growth.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 2041.

THINGS TO MAKE AND THINGS TO DO



A SIMPLE FLYING MACHINE

MOST of us know that the propeller of a steamship, as it revolves, drives the ship through the water. This is because the slope of the blades drives the water away from the ship behind, and this pushes the ship forward. A very simple flying machine can be made on the same principle, and when we have made it we shall perhaps understand better how it is that a ship is driven forward by the revolution of its propellers.

CONTINUED FROM 1741

two ends cut away but the slope of

same corners as we have cut away in the first end, but the opposite corners. Then we shall have the to the form of thin blades, the one will be opposite from that of the other, as shown in picture 3. Our toy is almost complete.

We have now to fix a stem firmly into the centre hole. A butcher's meat skewer, if made of wood, will do for the stem, or a wooden penholder, or even a thin lead pencil. The



1. Wood for the flying machine



2. Cutting one of the wings



3. The wings after cutting

First, we get a piece of wood about 5 inches long, 1 inch wide, and half an inch thick, as illustrated in picture 1. Soft wood, such as is used for firewood, will do well enough, so that we may simply take a piece of firewood if we can find a piece large enough each way. Right in the middle of it and on the flat side we bore a hole about a quarter of an inch in diameter. We can do this with a gimlet, and we must do it carefully and slowly so that we do not split the wood. The hole is made right through from side to side of the wood. Picture 1 indicates the position and size of the hole. A little distance from this hole at one side we cut away the corner until we get it down to look like picture 2. The end of the piece that we have cut will be almost triangular in shape. Now we begin at the opposite corner at the same end of the wood, and cut it away also until we have one end of the wood almost up to the hole in the form of a slanting blade, but very thin. Its resemblance to the blade of a ship's propeller begins to be seen, and it will look something like the right end of picture 3. We make the corners of the part we have cut round instead of leaving them square. This improves the appearance. That finishes one end of the blade. We do the same with the other end of the piece of wood, except that we cut away, not the

stem may be any length from 6 to 9 inches. We may glue the stem into the hole, but it is not really necessary. It will be sufficient if we



4. The completed

flying machine

push it in firmly, but not so far as to split the blades. When we have the stem fixed, we have only to hold the toy upwards with the stem between the palms of the two hands, then rub the hands together quickly, and release the machine as we make it spin. It should soar aloft as high as the roof of a house if we have done it properly. If we have not done it properly, we may find that the toy strikes the ground at once instead of flying. If so we may know that we have spun it in the wrong direction before releasing it, and we can do better at the next attempt. A little practice will enable us to make it soar high every time.



5. Flying the machine

MAKING A SET OF DOLL'S FURNITURE

THE DINING-ROOM AND THE KITCHEN

WE learned how to make the drawing-room and bedroom furniture for our doll's house on page 1733; for our dining-room suite, which we are going to make to look like walnut and crimson velvet, we want several yards of brown silk-covered wire at a few cents a yard. This is thicker and handsomer than the black, yet not so good for small curves. But our suite is massive in pattern, so this is just the thing.

The chairs are made on the same plan as those described on page 1734, except that they do not have a second band of wire round the seat. The shape of the back of the small

chairs is shown in picture 21. The angles should be well squared with the pliers. A good way to protect the silk covering of the wire from injury is to tie the tip of the little finger of an old glove on to each claw of the pliers. The easy-chairs, made deep and wide (about $1\frac{1}{2}$ inches at the back for the seat and $1\frac{1}{2}$ inches in the front), have a plain square back like picture 20, and the one with arms has them quite plain to match. For the cushions we need some ribbon velvet $1\frac{1}{2}$ inches wide, and a little wadding or cotton-wool.

Measure from the top of your easy-chair back to the edge of the seat in front, and take a piece of velvet about twice as long. Double the two ends over towards the middle, in proportion to the sizes of the back and the seat. Let the ends meet with a quarter of an inch to spare. Stitch the edges together very neatly, with silk to match if possible, along the selvedge of the velvet (or turn and do them on the wrong side, which is even neater) so that you have two little square pockets with their openings together, like picture 22.

Stuff a pinch or two of wadding into each pocket, and hem down the spare quarter of an inch to keep it in. This is, of course, the wrong side of your cushions. Turn them over, and attach them neatly to the framework of the easy-chair, so that the "woodwork" shows all round the back. Poke the velvet well into a deep crease between the back and the seat. It may need a few extra stitches there.

The small chairs will be quite easy to make after this, as they only need a square cushion the size of the seat. This may be made

by covering a piece of card with the velvet, putting a pinch of wadding between velvet and card.

The back and arms of the sofa are quite plain and square, the arms being as high as the back. The back is filled with one long cushion, wadded and joined up at the end. Another cushion goes over both arms and along the seat. A piece of card the shape of the seat is covered with velvet, with a little strip of wadding to plump it up. Enough velvet is left at each end to double over and make cushions for the arms, as shown in picture 23.

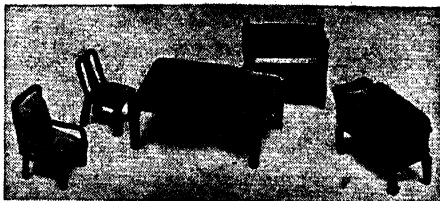
When the cushions are fixed in place, the ends of the arms should be slightly curled over, as in picture 24. Since the sofa cushions will not take the whole width of the velvet, it is better to join them on the wrong side and turn them. Where the

card is, the selvages can be drawn together across it with long stitches, the same as in the cushions.

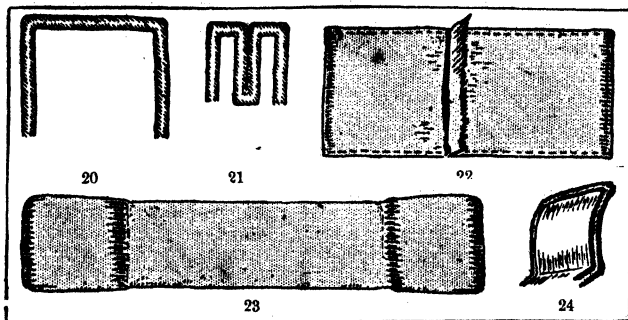
The table is very simple, just like the legs and seat-frame of a chair, with rather longer legs, a side about 3 inches and an end 2 inches long. If the wire is soft enough to allow of the legs being twisted, they will look much better. Allow half an inch extra length for this. The top is of satin or sateen to match the wire, stretched over card.

The carving table begins just like the table—the legs about half an inch high, starting with the back leg first. The end measures $1\frac{1}{2}$ inches, the side 2 inches long.

When the legs and sides are done, quite firm and square, bend the wire upwards for $1\frac{1}{2}$ inches from the top of the last leg. This is a pillar to support the upper shelf. Then turn sharply at right angles again to form the side of the shelf, which must be exactly the same length as the one below it; then another pillar, which is just like a leg, sewn securely to the top of the leg underneath, and so on, till we get round a second time. A third circuit, this time with tiny "legs" of a quarter of an inch, sticking up instead of down, to form ornamental knobs at the four corners, finishes the framework. The last turn of the wire is carried down the first pillar, to make it double, like all the



Dining-room set of furniture for the doll's house.



Plans for making the dining-room furniture for the doll's house.

MAKING A SET OF DOLL'S FURNITURE

others, and it is then cut off, and the end neatly tucked away behind the first leg. The two shelves are simply made of pieces of card, cut very carefully to fit the frame, and covered with brown satin or sateen.

The last room in the doll's house which we have to furnish is the kitchen.

The furniture is all made with thick brown satin wire and sateen to match. The chair is made in the same way as all the other chairs already described, the square-cornered back being filled with bars of brown embroidery silk set in and twisted just like the rails of the bedstead, as shown in picture 25. The grandfather's armchair is the same thing made larger, with a higher, wider back, and square arms filled with bars. The table is just like the dining-room table, except that the top is made of sateen instead of satin. The chair-seats are also of sateen, to look like plain wood.

The special piece of furniture in the kitchen is the dresser. It is the most difficult thing we have yet attempted, and for that reason it has been left to the last. It should not be started with less than two yards of wire, as it is made throughout without a join.

Start on a back leg (at the point marked with an arrow in picture 26), which should be about $1\frac{1}{2}$ inches long. Then carry the wire straight up to form the high back of the dresser. This should be 3 inches beyond the top of the leg, and $3\frac{1}{2}$ inches wide. Bring the wire down to the bottom of the opposite back leg, and when this is formed by turning the wire back on itself and doubling it closely as usual, bend the wire towards the first front leg, making the side of the lower edge of the table part of the dresser about 1 inch long. When the first front leg is done, carry the wire along the front of the dresser $3\frac{1}{2}$ inches to the last leg, and turn round the corner and along the second side or end of the table part to the point where you started.

You now have made what looks like the beginning of a sofa with a very high back. Every angle and every joint must, of course, be firmly secured with thread of the same color as the wire. When you have brought your wire round to the point where you began, carry it upwards parallel with the back for five-eighths of an inch, and fasten it firmly.

Then make the upper edge of the table part,

coming along the side $1\frac{1}{2}$ inches towards the front, and making what one may call a little leg, quarter of an inch long, exactly over the front leg, to which it must be strongly stitched.

Then go along the upper edge of the front $3\frac{1}{2}$ inches, and make another $\frac{1}{2}$ -inch leg just over the other front leg, turn the corner, form the upper edge of the end of the dresser, and fasten the wire to the back at the proper distance—quarter of an inch—above the top of the back leg. The dresser now looks like picture 26. The wire is at the point marked by the x. Now carry the wire across the back on a level with the upper edge of the table part; and, having secured it, take it a distance of three-quarters of an inch up the back, double it (as in picture 27), making a projection, or horizontal "leg," quarter of an inch long as a support for the first shelf.

Carry the wire upward another three-quarters of an inch, and form the projection for the upper shelf. Carry it now across the back, and form a corresponding support for the upper shelf at the other side. Turn downwards to make the second support for the lower shelf exactly opposite to the first, and secure your wire at the point marked x in picture 28 (drawn larger than picture 26). All that remains to be done is to carry the wire across the back of the dresser once

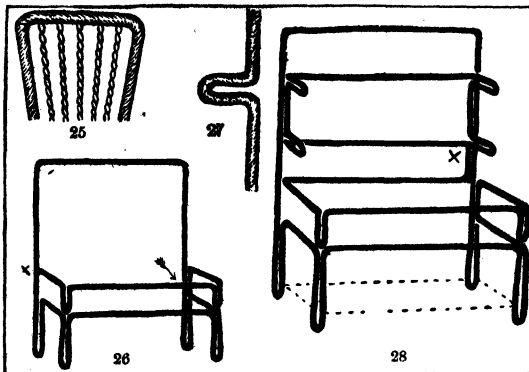
more, and to fasten it off by turning it round the back wire just below the first support for the lower shelf, and, nipping the end closely, to sew it down upon itself. The finished framework of the dresser looks like picture 28. Fasten off at the point marked x. Now cut a piece of card to fit the back, 3 inches long and $3\frac{1}{2}$ inches wide, not too thick, or it will be top-heavy, and so fold it up in a piece

of sateen, 7 inches long and 4 inches wide, that the edges of the sateen can be turned in, and the whole sewn up entirely to cover the card, the same way as we made the top of the dining-room table, and fasten it in place. A top to the table part of the dresser, cut to fit, and a front and ends must also be neatly made, and fixed in place. Narrow strips of card covered in the same way form the shelves resting on their supports, and, lastly, a pot-board covered with black may be fixed where shown by the dotted line; this will help to balance the back.

In another part of the book we learn how to make the doll's house itself.



Kitchen furniture for the doll's house.



Plans for the kitchen furniture for the doll's house.

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO IN THE MIDDLE OF OCTOBER

THE subject of planting bulbs in the open ground has already found a place in these articles, but it is possible that a good many varieties could not be planted earlier than the present time, as the little plot was full of summer and autumn flowers. All this month bulb-planting in the open ground can take place; yes, and even early in November where necessary, but we must bear in mind that the sooner it is done the better.

Enough has already been said as to the manner of planting. To-day we will think for a few moments of another, and, to some of us, quite the most fascinating and interesting method of growing bulbs. It means a miniature garden of flowers in the house, for we are going to consider the growing of all kinds of bulbous plants in glass or china bowls.

First of all we obtain our bowls, and the prettier they are the better, though even pudding dishes would do. In the bottom of the bowls some bits of charcoal may be placed; charcoal keeps everything sweet and healthy, and it is a good plan to have a little always at hand, and even to mix a little with potting soil when replanting any of our pot plants.

But to return to our bowls. Upon the charcoal we place coconut fibre and shell mixed, and it may be as well to say that this can be bought, mixed together in the right proportions, as coconut fibre refuse, for thirty cents a peck. We bury the bulbs in the fibre and keep it in the dark, just as was described for bulbs planted in ordinary flower-pots in soil, and for about the same length of time, the reason being, as we shall remember, to encourage the growth of the roots before top growth begins.

The watering is an important consideration, and we quote the following directions as being particularly clear and easy to follow: "Care should be taken that the fibre is never allowed to get dry, or failure is sure to ensue. If the bowls are filled with water once a week, and then tilted, pouring off the surplus water, that will ensure the fibre keeping evenly moist throughout the bowl." After the bowls are brought from their dark quarters they should be kept from very strong light for a few days, but after that they may be placed in some sunny spot close to the window, and during the winter they should be kept free from frost. Narcissus are very beautiful grown in this way; so are the delicate-looking little Roman hyacinths.

As the summer and autumn flowers fade in the garden a very busy time begins. Much depends upon the weather, but the time is

approaching when we must put everything in order for the winter. The whole plot will have to be dug over, but it will be most important not to injure the hardy plants that will remain. Therefore, where there are many of these, it is safer to dig with a fork than with a spade, for, of course, a spade is much in danger of cutting roots through if it comes across them. Annual plants may all be pulled up and carted away as they cease to flower.

We must remember that many of our hardy perennial plants die down for the winter, their leaves and stems wither and die, but on no account must we conclude that the plant is dead; the roots are very much alive, and in the spring beautiful fresh young growth will peep through the soil. Nature has a wonderful way of using all sorts

of methods to enable her hardy plants to pass the winter safely. Some, like these hardy perennials, are, as it were, going to sleep, and some, like the bulbous plants—the snow-drops, and winter aconites, and others—are waking up, for these take their sleep during the hot summer months. Some plants remain fresh and green winter and summer alike, like the sweet-william, the beautiful little dwarf gentian, and the pinks and carnations. Just as everything was made neat and trim for the summer, so during the next few weeks

must everything be made neat and tidy for the winter. All dead leaves, stems, etc., should be cleared away, and stakes taken up and stored, except where plants, like chrysanthemums, need them still.

Now, if our gardens were only made and planted in the spring, our hardy plants will not need dividing, but if they have been made two or three seasons then probably some of them will be all the better for it. Say we have some large clumps of campanulas—the beautiful blue or white bell flowers. We lift the whole clump, and take a sharp knife and cut it into three or four portions, and replant each one separately. The reason we divide

clumps that have grown to a large size is this: they throw up too many flowering stems for these to be well nourished and produce a fine blossom, and, in consequence, towards the centre the plant grows poor.

We should remember that it is good for the future welfare of a plant to replant it on a different spot from that which it has been occupying. If we do not need all the pieces we can make of a divided plant, we should replant the strong or outer portions of our campanula; and if we have any seedling plants not yet put into their flowering quarters, we should get them there without delay.



Hyacinths grown in a bowl.



Preparing the bowl with charcoal and coconut fibre.

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO AT THE END OF OCTOBER

ALL the work among the hardy perennials, and digging, and trimming that was advised in the last part may still be done if not already completed. The chrysanthemums, the dahlias, and the Michaelmas daisies are still making our plots glad and gay with color. When a sharp frost does come and blackens all the tops of the dahlias we need not be frightened, but when that happens the time has arrived to dig up the plants. If we put them into the ground in early June as rooted cuttings, we shall be surprised to find that, in the meantime, these roots have become large tubers. We take them up as carefully as possible so as not to injure them; then we let the wet soil that hangs about them become quite dry. It may take some few days, so that we must be careful to place them somewhere out of reach of any night frost that might occur. After this we store them for the winter; and the best way is to put them into something and cover them well over with dry sand or soil.

We may treat our gladioli in exactly the same way, but we should not lift them until the tall, sword-like foliage is turning brown and withering, for the foliage is of use to the plant just so long as it remains green. It is very important to store them where no winter frost, however sharp, shall touch them, for this makes them turn soft and decay.

The present is an excellent time to buy hardy perennial plants if we do not feel that our little gardens are sufficiently well stocked. With all the summer behind us, we have had full time to make up our minds what are our favorite plants, or what we have seen in other people's gardens that we desire for ourselves. We have probably found out by this time that often there are many varieties of a plant, and that it is deeply interesting to grow several of these varieties. Let us take the case of the *Dianthus* family. This includes our lovely carnations and the red and white pinks, and also the sweet-williams and many others well worth growing. This relationship of plants to one another is one of the things you may well study; and I do not think you will do better than to turn to the pages of some good catalogue, look up the plant that you seek—say, this *Dianthus*—and discover for yourself what a large family party it includes, and gradually, perhaps, you will come across first one, then another. You will rear this from seed, and that you will buy, someone will give you a third, and so on. The campanulas, the primroses, and the pinks all belong to large families.

When we are thinking of taking cuttings of geraniums and other plants, it should be noted

that if cuttings are taken of the useful yellow calceolarias, there is no need to take them so early as was necessary for the geraniums. The end of October, however, is quite the best time for this work. Calceolarias are almost hardy, so that they need but little winter protection. They may be put into a frame, and have air every day through the winter, except when it is frosty or wet, by raising the lights; or we have seen them brought quite safely through a severe winter merely planted outside in the border under the wall of the greenhouse, and some stout boarding put in front of them and over them, which was wholly removed during most days. I think we may say that every one of our little plots should boast its rose-tree, one at least, and another if we can spare the space for it. It needs to have the ground it is to occupy quite deeply dug; yes, even to the depth of two feet if that be possible without coming to the subsoil. Secondly, it likes plenty of good rich food; and we supply this to a great extent if we dig some well-rotted stable manure into the soil.

It is not enough simply to dig the hole into which the rose is to be put, but the soil all

round it needs to be dug over, so that the roots, wandering in search of food, may spread out in all directions. The soil may be allowed to settle for a few days while we decide upon the names



Chrysanthemums and dahlias.

of our roses. Perhaps one or more may be chosen from the following short list:

Caroline Testout—one of the best bright-pink roses ever grown.

Viscountess Folkestone—free flowering, pale flesh-color.

La France—a little paler than the Caroline Testout.

General Jacqueminot—a bright red.

Ben Cant—a deep crimson.

Frau Karl Druschki—a fine white rose.

Or it may be we should like to have a little monthly or China rose, that is as strong and able to take care of itself as a wild hedge-brier; or, even, we may have a fancy for one of the dainty little Scotch roses, either white or yellow. The Scotch rose will flower even in a garden that gets but little sunshine; whereas the rose generally may be regarded as a sun-lover, and the position chosen should be as free and open as possible. The hole must be dug large enough to allow the roots to spread out on all sides; no doubling of them under, or bending them round to make them go into a hole too small. No, indeed! the roots must be spread out quite freely, then the soil filled in, not merely thrown in loosely, but you may carefully tread it firm round about the newly planted tree.

HOW TO FOLLOW A TRAIL

THERE are few pastimes that can be enjoyed in the country more interesting and more likely to develop our powers of observation than that of following a trail or tracking some person or animal from place to place. We learn to use our eyesight to the full extent, seeing things that others do not see; we get into the habit of noticing the smallest details, and we develop our brains by associating together things and ideas and signs.

We all know the story of the dervish traveling in the desert of Arabia, who astonished people by his apparently wonderful powers, but whose real power was simply that of the observing eye. A camel was lost, and the dervish, without seeing it, knew that it was blind in its right eye and lame in its left leg; that it had lost a front tooth, and was laden with honey on one side of its back, and wheat on the other. He knew that a camel had strayed, for he had seen its lonely track in the desert, without any signs of a man accompanying it; he knew it was blind in one eye, for it had cropped the grass on one side of the track only; he knew it must be lame in one foot because that footprint was less distinct than the others; he knew it had lost a tooth because, wherever it had grazed, a small tuft of grass was left in the middle of every bite; and he knew from the busy little ants on one side of the path and the flies on the other side that wheat had been carried on one side and honey on the other.

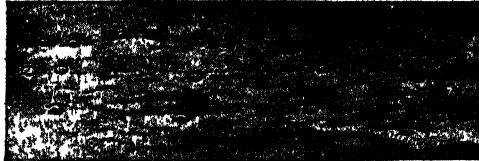
This power is a very valuable one, and we may all, by constant practice, become more or less masters in it. To develop it, no practice is better than that of trying to follow a trail. It may not be very easy at first, but we must not get discouraged but must persevere, and we shall then soon find that we can see what others cannot see, and the interest of it will grow, and we shall then be following trails most enthusiastically.

It is better, in starting, to select some place where footprints leave a more or less distinct impression. In winter, of course, the ideal conditions are found after a fall of snow, when the footprints both of birds and animals are clearly imprinted; and in summer we may take up a trail—that is, start following footprints—in a dusty or muddy road. There may be the footprints of a number of people all in the same road. We select the one to be followed, and it will be of great assistance to have a notebook in which to write the measurements and particulars of the footprints, so that we shall have it for reference later in our expedition. We now follow the trail of the footprints,

noting its character as we go along, and seeking to discover something that shall tell us about the person whose prints we see. For instance, we can tell at what pace he was going. When a man walks, he puts the whole flat of the foot on the ground, and the distance between the footprints will be slightly less than a yard. If he runs, the distance from print to print will be rather more than a yard, and the toes and front part of the foot will be more deeply impressed than in walking, especially if the ground be soft. There will also be a little of the ground kicked up by the toes each time the foot comes down, and this will be noticeable. Where different footprints clash, we must be careful to note any peculiarity in the one we are following—the order of hobnails, the size of rubber heels, and so on.

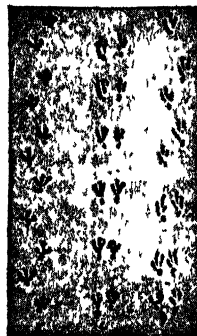
If we miss the footprints owing to the road getting less dusty or snowy, we must not give up. We should carefully mark the place where the last footprint is visible, and then move round in front of it in a wide semi-circle, seeking for some sign that will help us to continue the trail. If the sun is shining, it is always a very good plan to look along the surface of the road against the sun. Very often an indistinct trail can be seen in this way when it is invisible otherwise. This is most particularly the case with the track of a bicycle or motor-car on a hard road, as these leave but very faint traces.

Should the footprints turn off across a field, it is often easy, by looking well ahead, to follow the trail by noticing the blades of grass slightly trodden down and pushed to right and left. In a wood, broken twigs are generally tell-tales, and will help to keep us on the right trail. The hoof-marks of a horse are perhaps the most distinct and are easier to follow on a road than the footprints of a man, for the animal, being so much heavier, leaves a far deeper impression on the earth. The first picture on this page gives us an illustration how the hoof-prints appear of a walking, a trotting, and a galloping horse. The footprints of birds and of animals like cats and dogs are very interesting. It is possible for us to know the character and habits of a bird from the impression of its feet. If the footprints are one in front of another, the bird walks, and is a ground bird; if the prints are side by side, then it hops, and is a tree bird; and if, in a single trail, the prints are sometimes of one kind and sometimes of another, the bird lives partly in trees and partly on the ground. The second picture shows very clearly how the three kinds of tracks appear.



A HORSE'S HOOF-PRINTS

First line, walking; second, trotting; third, galloping.

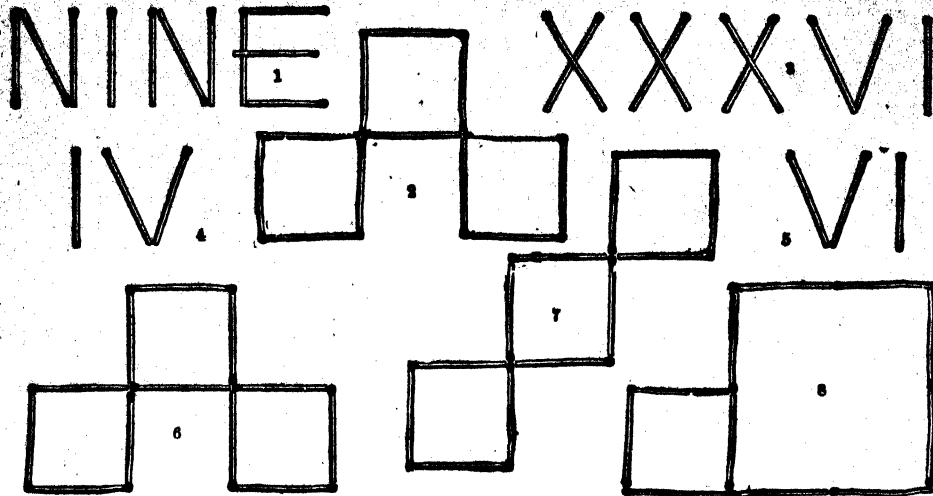


BIRD TRACKS

First row, a ground bird; second row, a tree bird; third row, a bird that lives partly on the ground and partly on the trees.

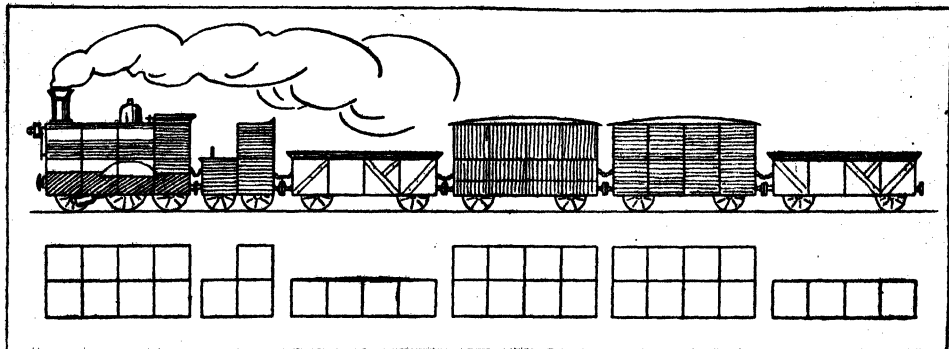
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ANSWERS TO THE MATCH PROBLEMS ON PAGE 111



On page 111 appeared some problems to be attempted with matches or pins. The pictures above show how these problems are solved. It will be seen that a few of them are just "catches," but they are all interesting.

A RAILWAY TRAIN BUILT UP FROM SQUARES



On page 1097 we saw how to build up some queer figures from squares. Here is a train which can be made in the same way. The little sketches below show us how to start building, with the squares as the foundation.

FORFEITS

IN most of our games we claim forfeits from the unsuccessful players, and no party would be complete without forfeits. In addition to those which are ordinary and well-known forfeits, there are others which puzzle those who have to pay them, and cause much merriment among the spectators. Here are some which are well worth trying in any large party.

Hold one ankle in one hand and walk round the room.

Walk round the room and smile at six persons in turn.

Stand on one leg and count two hundred.

Spell some long word, like "parallel," backwards.

Go round the room and give a piece

of good advice to everyone in the company.

The German band forfeit* enables several players to pay off at one time. Each selects some instrument, and then all go to the middle of the room and try to imitate the instruments they have chosen, both in sound and in their method of playing.

The player has to compare each person in the room to some object and give a reason for the likeness.

In the cat's concert a number of players who are to pay forfeits go to the centre of the room, and, at a given signal, each sings any song that he likes. Of course, no two are likely to sing the same song, and so the mixed sound that arises can be easily imagined.

THE NEXT THINGS TO MAKE AND TO DO BEGIN ON PAGE 1937.

THE HAPPY DAYS OF CHARLES THE FIRST



CHARLES THE FIRST AND HIS HOUSEHOLD ON THE RIVER



THE CHILDREN OF CHARLES THE FIRST: CHARLES, JAMES, AND MARY

These two pictures were painted during the happy days of Charles I., when he lived with his children around him, before he yielded to the evil counsels of others and set himself against the people. There is a beautiful story of these days which tells us that while Charles was hunted up and down the land the leaders of the Parliamentary army would sometimes visit his children, who were captives. They were all courteous to these innocent children of an unhappy father, but there was only one who knelt to them in loyalty, and that was Cromwell. We can imagine the stern Cromwell, who was to hunt Charles Stuart to his doom, kneeling to the king's little son James, who was to become king and to be himself driven from his throne.

The Book of MEN & WOMEN

WHAT THIS STORY TELLS US

THIS is the story of the men of the Great Rebellion in the seventeenth century by the English people against their king. Charles I. was a man who made many men love him. But it was his evil fortune to be a king, and he believed that God sent kings to rule as they liked, even if they had to act unjustly and to break solemn promises. Therefore from the beginning he insisted on going his own way, often against the laws. But the Parliament men held that the king had no right to set aside the laws, and therefore the king and the Parliament soon found themselves quarreling. Parliament said that the king might not force the people to give him money, or to worship God in any way other than they pleased, and because the king insisted on these things men refused to obey him, and Charles had them put into prison. We read here of men who fought in the war that these quarrels brought about.

MEN OF THE GREAT REBELLION

OLIVER CROMWELL AND CHARLES STUART

THERE was a great painter called Van Dyck, who made many portraits of King Charles. If you have ever seen one of them, it is easy for you to understand why, with all his faults and his follies, men loved him with a passionate devotion, and how he still casts a spell over men's minds.

There is a dignity, a majesty, in the grave, delicate face, a charm in the haunting, melancholy eyes, a kingly air in the pose, which make you feel that this was a man for whose sake many would die gladly. And yet we can see that it is not the face of a man wise in counsel or strong in action. Grace and graciousness are there, but no jot of power.

Now, if you look on the face of Oliver, it is as though it had been hewn roughly out of solid granite, grim and massive and hard; there is power in every line, but of grace or graciousness no whit. This man is a born fighter and a born leader. The other is born for defeat.

During the first years of King Charles's life he was not the heir to the throne; he became heir on the death of his elder brother, Henry. From his youth, the prince had evil counsellors. His father, King James I., was very clever, but we read on page 1036 how the shrewd King of France, Henry IV., described him as "the wisest fool in Christendom."

CONTINUED FROM 1752



Never was a monarch so undignified as he; perhaps that is one reason why Charles bore himself always with such dignity. But James gave the prince for a companion a young gentleman who was very handsome,

very brave, very proud, and very worthless; whom he made a lord, and who became famous as the Duke of Buckingham. Buckingham utterly won the heart of Charles, and taught him to think that princes and their favorites are altogether above the law. Moreover, it was due to Buckingham that Charles married the pretty French princess Henrietta Maria, who proved, in her turn, a counsellor fully as bad as Buckingham himself, after the duke had been slain by a crazed assassin. So that the two people whom Charles loved best in the world were the worst advisers he could have found, yet it was their advice he always followed.

But of all the ill counsel that he got from these two, or from his father, the worst was their teaching that the word of a king may be lightly given and lightly broken; and this, more than aught else, brought Charles to his ruin. For although the people were wroth with him before he signed the promises in the Petition of Right, they were far more angry afterwards; because, although he may have made himself believe that he broke no pledges, yet he knew well

JULIUS CÆSAR

HERBERT SPENCER

enough what all men supposed that he meant by the promises he had given; and the people felt that he had played them false. And, again, when he gave up Strafford to his doom, all knew that he had broken his word; and when the Parliament resolved to fight, it was because they would not trust his faith. And at the last, when Cromwell and his party resolved that the king must die, it was because they had lost all hope that he would keep the promises he made if he were allowed to live.

THE EVIL TEACHING OF HIS BOYHOOD THAT COST KING CHARLES HIS CROWN

So that evil doctrine not only brought upon England the countless woes of civil war, but it brought upon Charles himself the loss of his crown and his life.

Yet Charles really believed that he was in the right, except when he surrendered Strafford. For he held that the king is appointed by God, and should rule his people not as the people think good for themselves, but as the king thinks good for them, and that, whether he rules ill or well, none can call him to account save the King of kings; therefore, if his people are disobedient, he may compel them to his will, regardless of law. Besides that, he saw that the Parliament was now demanding rights which it had never claimed before, so that if he gave way there would remain to the king no power at all. And it was this which made some Parliament men, like Hyde and Falkland, go over to the king's side.

Now, after the king had most openly broken the law by entering the House of Commons, seeking there to arrest the five men who were the chiefs of the party that opposed him, he went away from London, and there was little enough hope that war could be avoided. And some months later Charles unfurled his standard at Nottingham, having gathered troops round him; and this was the beginning of the great civil war.

OLIVER CROMWELL, THE MAN WHO WAS TO CONQUER THE KING

Let us see, now, what manner of life had been lived by the man who was to conquer the king. Oliver Cromwell had farmed his lands in Huntingdonshire, seeking to make no stir in the world. Once, indeed, he had come forward in his own part of the country as champion of the people's rights in the matter of

certain lands of which they were being robbed. But for the rest he was known chiefly as a very religious man, who for his religion's sake had been willing to leave his own home and seek a new one in America. Some say that he and his company were ready to depart, when, by the king's order, they were stopped from going. When that Parliament met against which the king declared war, Cromwell was one of the members—a rough, uncouth figure, unskilled and confused of speech, but a man of mark by reason of his deadly earnestness. Yet, because his strength lay in action, not debate, it was not at first seen that he was a mightier man than any of the others assembled there.

Then the war broke out, and the tide ran in favor of the Cavaliers and against the army of the Parliament. It was Cromwell who saw how the tide must be turned. He saw that what made Rupert's soldiers so irresistible was the proud sense of honor which made them fear nothing but disgrace. He saw that these men must be faced by soldiers who, being filled by the burning love of a great cause, had no more fear of death than they. Then victory would fall to those whose discipline was best.

THE MEN OF THE GREAT PURITAN ARMY

Therefore, Cromwell went down to the Eastern Counties, and gathered troops of men picked out for their zeal in religion, as well as their strength and valor and horsemanship, and trained them in utter obedience. When they came to the shock of battle these Ironsides swept all before them, yet were ready to rally to their chief's command and stay their hands from needless pursuit and plunder. After their stern fashion they were godly men who believed with their whole souls that their cause was the cause of freedom and righteousness.

So, at Marston Moor and Naseby fight, the Ironsides smote and shattered the gallants whom none before had been able to resist. After the rout of Naseby the king's cause was lost, and Charles gave himself up to the Scots, who were in arms to aid the English Parliament, and after a time the Scots gave him up to the Parliament. For what the Scots desired was that the king should accept their Covenant, and should replace the form of worship of the English

Church by Presbyterianism, as most of the English Parliament desired likewise. But, although Charles might easily have won back his crown and most of his power by consenting thereto, this was a thing which he would in no wise do, being as loyal to what he held to be the true religion as any Puritan.

WHY CROMWELL AND THE ARMY RESOLVED THAT THE KING MUST DIE

So the Parliament chiefs sent the king under guard to Holmby House. But now Cromwell and the soldiers were ill content with the Parliament, seeing that it was willing to make terms with the king which would not have secured the liberty of religion, which was the thing they most cared about. Therefore, they sent a troop of soldiers under command of Cornet Joyce to bring the king away from Holmby House and keep him under charge of the Army itself. And then, because the Army, and the Parliament, and the Scots were in disagreement, the king tried privately to treat with each of them, and to make them the more obstinate in their disagreements with each other, hoping that thereby he might yet triumph over them all.

But when he tried to escape from the country, and was stopped in the Isle of Wight and held prisoner at Carisbrooke Castle, the Royalists rose in insurrection, and Cromwell saw that the king had been only making pretences. And so he and all the Army were resolved that when the insurrection was put down there could be no peace in the land unless the king's life were ended and the will of the Army were made to prevail.

THE STRANGE SPECTACLE THAT ENGLAND SHOWED THE WORLD

Then England showed the world a strange spectacle. For they who had risen in arms against their king in the name of the law, which is higher than the king, now set up a tribunal to judge the king which was itself without rights from any law. So that now it was the king who stood for the law, and his judges who stood for arbitrary power, which means power that is not restrained by law. And the Army, having this power, cut off the head of the king in the name of the people of England, though all knew that the chief part of

the people of England shrank in horror from the deed.

Thus, in the last days of his life, the king who had wrought so much ill to the land became a martyr, and throughout those days he acted with a most royal dignity and showed great tenderness and courage. He would make no defence before judges who had no right to try him. In his prison he remained calm and collected, mindful of his friends and his children, but with his thoughts bent upon eternity. And when the last hour came, and he stepped through the window of Whitehall on to the scaffold, and looked on the crowds that had gathered to see how a king can die,

He nothing common did nor mean
Upon that memorable scene,
But bowed his stately head
Down as upon a bed.

And when the executioner struck off his head and raised it, with the words, "This is the head of a traitor," the crowd answered with groans and tears.

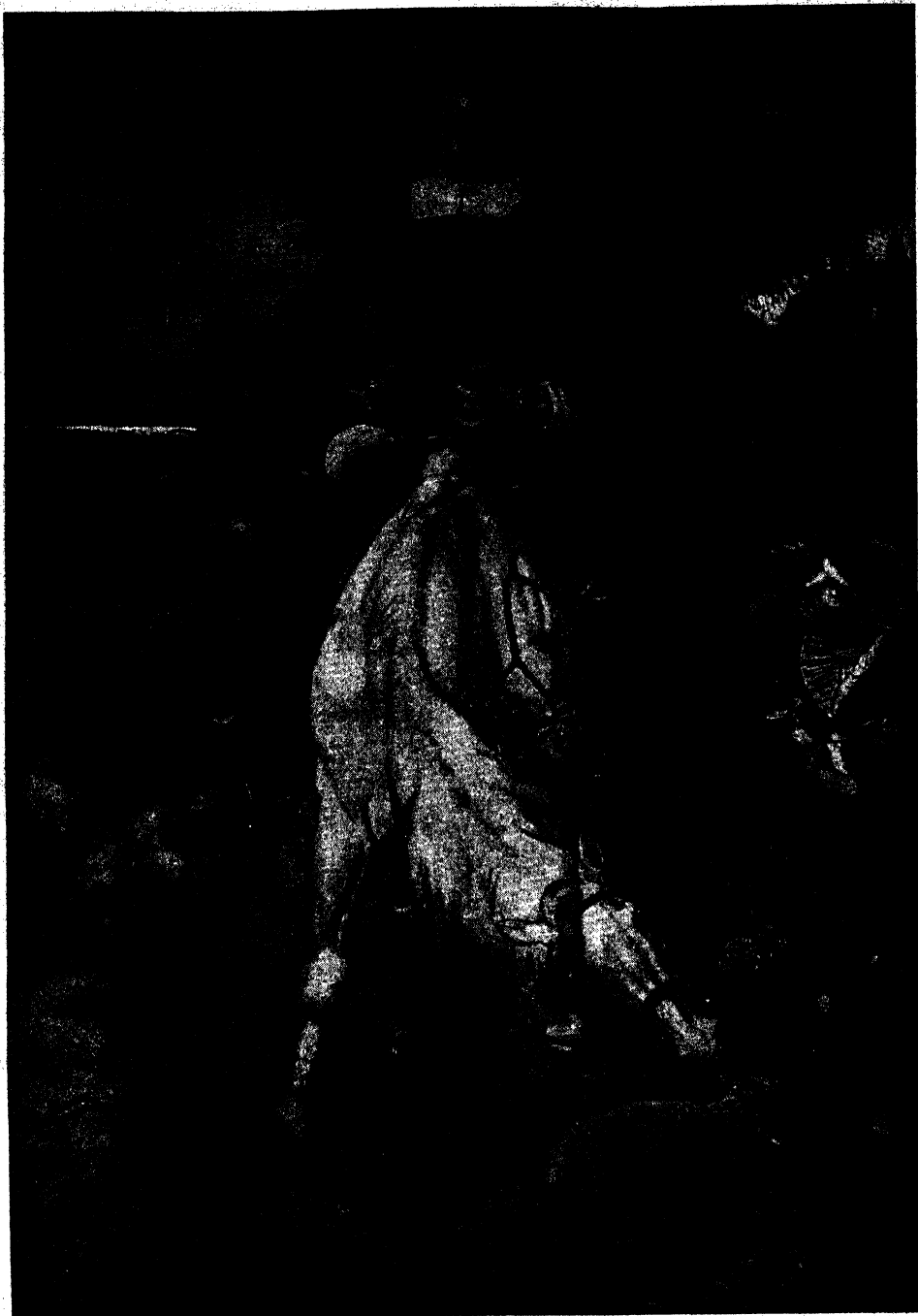
THE MANNER OF MAN THAT OLIVER CROMWELL WAS

Let us turn now to the man who, more than any other, had brought about this terrible deed. Cromwell had striven his hardest to make terms with Charles, and to restrain the Army, which would willingly have made away with him long before. But at last he had judged that there was no way left but the terrible way he took. When his mind was made up, he never faltered. On the king's death warrant there is no signature written more firmly or boldly than that of Oliver Cromwell.

For no man could be more utterly merciless than he, if it seemed to him that the need arose for firmness, as he showed when he slew and spared not at the taking of Drogheda and Wexford in Ireland. Yet he had no love for bloodshed; his mercilessness was the more terrible because he loved mercy. He made himself king of England in all but the name, just as he slew King Charles because he could see no other way of restoring order in the land.

He established order and made the country prosperous. The foreign nations, which at first treated England as an outcast state when she had put her king to death, became eager for Cromwell's friendship and feared his hostility. At

OLIVER CROMWELL, THE MAN OF IRON



In the struggle between the English king and the English people, it was Cromwell who led the people's side. He raised an army true to him, to the nation, and to the cause of freedom; and this army was never beaten. After the war was over, King Charles was beheaded as a traitor and his crown offered to Cromwell. But Cromwell would not be king. He ruled England as Protector. This picture, by Ford Madox Brown, shows Cromwell riding, and we see in his face, calm and hard as if hewn out of granite, the power that is missing from the face of Charles, as we see in Charles's face the grace that is missing from the face of Cromwell. In the history of England there is not a stronger, a braver, and a truer man than Oliver Cromwell.

CHARLES STUART, THE FAITHLESS KING



It is easy in looking at this picture, painted from life by Van Dyck, to see why, with all his faults and all his follies, men loved King Charles with a passionate devotion. There is a dignity in the delicate face, a charm in the haunting, melancholy eye, a kingly ease in the pose, which make us feel that this was a man for whose sake men would die. Yet this lovable and much-loved man set the people of England at war against themselves by his yielding to unwise counsels, and his strong feeling that he was sent by God to rule people as he chose, even though he had to act unjustly and to break solemn promises. In the end the king was driven from the throne, tried, and put to death as a traitor; and there is not, in our history, a more sad tale than his.

his bidding the French stopped persecuting the Protestant Vaudois. Since the days of Elizabeth, the foreign nations had cared nothing for England's will or wishes, till Cromwell trained his army, and Blake proved himself a match for Van Tromp on the seas. And Cromwell did this when the country had just been rent with a great civil war, and when one half of it was thirsting to overthrow his government.

OLIVER'S STORMY LIFE ENDS IN A STORM ON HIS GREAT DAY OF TRIUMPH

Perhaps it is not easy to love a man so rugged and ungainly; it was easy to hate him. His enemies hated him so much that during the last years of his life he always wore mail under his dress, lest he should be slain by an assassin. They hated him so that, when Charles II. was called back to the throne, Cromwell's body was torn from the grave to be hanged in chains like a felon's. Yet this was a man whom the great poet John Milton held in the highest honor, they two being well known to each other, and of one mind in affairs of State; for Milton, of whom we read in another part of this book, gave much thought to such matters, though his greatest fame comes from his poetry. It is odd that so strong a man should have had so feeble a son as Richard,

whom men called "Tumble-down Dick," about whom we read on page 1040. But with all his massive, uncouth force, Oliver was tender of heart. It is pleasant to think how, when the grim soldier had become the greatest man in the land, he brought his old mother up to live in his house; and because the poor old soul lived ever in fear that his foes would kill him, he made a rule to show himself to her every evening, so that she might go to sleep knowing he was safe.

Cromwell had taken up the task of fighting the king, of killing the king, and of ruling the country, because he saw things that must be done, and no other was fit or able to do them.

"God knows," he said, speaking sober truth, "I would have been glad to have lived under my woodside, and to have kept a flock of sheep, rather than to have undertaken this government."

He was willing enough to lay the task down.

"My work is done," he said, as he lay dying; "yet God will be with His people."

He lived a stormy life; it was fitting that a great storm was raging when the hand of Death laid hold upon him. On the anniversary of two of his great victories, Dunbar and Worcester, the spirit of the great Protector passed away.

THE MEN OF THE TWO ARMIES

LEADERS WHO GATHERED ABOUT CROMWELL AND THE KING

AT first there were three men who stood up in Parliament against the king—Sir John Eliot, John Pym, and Thomas Wentworth. Of these three, the first died, as men say, a martyr to his cause. The Parliament, headed by these three, made the king sign a declaration, which was called the Petition of Right, that it was not lawful for him to make the people pay taxes without consent of Parliament, or to put people in prison unless they were brought to trial, and it was proved that they had broken the law. But he had hardly signed it when he began to demand certain taxes, which, as he said, had nothing to do with what he had signed, and to put people in prison if they refused to pay. But when Parliament came together, Eliot made the great speech about which we read on page 1038—a speech

which made everyone more resolute than ever to resist the king's unlawful demands. This made Charles so angry that he had Eliot thrown into prison, and kept in close confinement, so that he became very ill; and still Charles would not make the imprisonment any the less severe, so that after two years Sir John died. And men loved his memory, for he had been a very noble gentleman, caring nothing for his own ease, but ready to endure all things if so he might help to keep England a free nation.

THOMAS WENTWORTH, WHO DESERTED THE PEOPLE'S SIDE & TOOK THE KING'S

Very different was Wentworth, who had been Eliot's friend; for, just after Charles had signed the declaration, Wentworth went over to the king's side, so that the other side, of which he had

been a chief, gave him the name of the Apostate, which means a man who has deserted a great cause. But from that time there was no man who wrought so shrewdly or so sternly to make the king all-powerful as Thomas Wentworth; either because, having seen that there was no hope of king and Parliament ruling in agreement, he thought the rule of the king would be better than the rule of Parliament; or, as a great poet has thought, because he loved the king and hoped thus to save him from destruction; or for some other reason.

At any rate, this Wentworth, with the grim face and the fathomless, unsmiling eyes, was sent first to rule the North of England and then Ireland. With an iron hand he ruled, careless of law, but careless, too, whether the foes he crushed were strong or weak; and all had to obey his will; while for eleven years he ruled without any Parliament.

But a time came when Charles needed more money than he dared demand without Parliament's consent; and when the Parliament met, seeing how strong and clever a servant Charles had in Wentworth, who was now Lord Strafford, and that if Strafford lived he might make the king too strong for Parliament, they charged him with treason before the House of Lords.

HOW THE MAN WHO DESERTED A GREAT CAUSE WAS DESERTED BY THE KING

Yet Strafford stood up and defended himself against every charge so shrewdly and skilfully that they saw the Lords must let him free.

Then they resolved to pass a special Act of Parliament, declaring that Strafford was dangerous to the State, and must be beheaded—since they could not prove that he had broken the laws which would have made him guilty of treason. And all the people called for the blood of Strafford; yet he could not lawfully die unless the king consented to his death.

At last, fearing the wrath of the people, and that if Strafford were not slain they would clamor for the life of the queen, whom they hated no less, Charles yielded his consent, even though he had promised Strafford that not a hair of his head should be harmed. Can we wonder at Strafford's bitter exclamation when he heard of the betrayal—"Put not your trust in princes!" So

he was slain, and the king gave up to death his most faithful servant. And now there was none left who could save him from his own doom.

Yet because Strafford fell before his work was completed, he could not prevent the rebellion, and what he had done only made the Parliament the more afraid of what the king might do unless his power were bridled. So that, although Strafford did not live to see the rebellion himself, yet he was in great part the cause of it.

THE ARCHBISHOP WHO HELPED TO BRING ABOUT THE REVOLUTION

Another man whose doings went far to rouse the anger of the people against the king and his ways was William Laud, who was Bishop of London and then became Archbishop of Canterbury.

Very many of the people at that time, throughout the country as well as in Parliament, were Puritans; that is, they were Protestants who had a great fear and hatred for the Roman Catholic Church, and were very ready to think that the clergy, and especially the bishops, meant to bring the country back to what they called Popery; and this they feared all the more because the king had married a French wife who was a Roman Catholic. But when they saw men like Laud set at the head of the clergy, they were the more angry and alarmed; because there were many practices and doctrines of the Roman Church which Laud taught and copied in the English Church, holding that this was what the English Church was meant to teach.

THE TWO FRIENDS WHO RULED ENGLAND STERNLY AND WERE PUT TO DEATH

And, being archbishop, Laud forced the clergy, many of whom were willing enough, to follow these ideas, trying to make everyone go just in the way that he thought best, although there were many people whose consciences would not suffer them to do these things. And in these things the king gave him countenance, while both he and the clergy who agreed with him taught that the king ought to be obeyed in all things. So that the Puritans became very angry, and began to think that the governing of the English Church ought to be taken away from the bishops, and another plan followed which is called Presbyterianism; while others thought the

congregation of each church ought to have the right of choosing its own ministers and managing its own affairs.

And when they charged Strafford with treason, they charged Laud also; and him, too, they put to death, though not till some years later. Strafford and Laud had been great friends, and it was they two who gave the name of "Thorough" to the way of governing that they had practised. The picture on the next page shows us how, when Strafford was on his way to be executed, he passed by the window of Laud's prison, and kneeled down to receive the old archbishop's blessing.

JOHN PYM, WHO ROSE AGAINST THE MAN WHO HAD BEEN HIS FRIEND

We have seen how brave Sir John Eliot died in prison, and how Wentworth changed sides; now let us look at the third of those men who had done most to force King Charles to sign the Petition of Right. This was John Pym, a country gentleman who was also a lawyer. Now he, being a friend of both Eliot and of Wentworth, knew that when Wentworth joined the king's party he must thenceforth be reckoned the most dangerous and deadly foe of freedom. Therefore, when the Parliament met again after so long a time, as we have seen, it was John Pym who first ventured to rise up and attack the king, and who did everything in his power to bring about the destruction of the man who had once been his friend. It was Pym who most roused the people in the country, and whose words carried most weight in Parliament. He was the boldest as well as the shrewdest of all the Parliament men, and now there stood beside him one who was not, indeed, so skilled an orator, but who was not less honored for the nobility of his character, John Hampden.

JOHN PYM AND JOHN HAMPDEN LEAD THE NATION AGAINST THE KING

Now, these two had some ado both to give heart to those who feared the evils of a civil war more than they hated tyranny, and to restrain those who were too hasty to take thought quietly how best liberty might be secured.

But so great was Pym's influence, so mightily were men swayed by his words, that he came to be called King Pym by his opponents, in mockery, but in

admiration by his friends. And those two, more than any others, the king himself sought to overthrow, so that one day he came suddenly down to the House of Parliament, where the Commons were sitting, having with him a band of soldiers, and willing there to arrest them with three others even in the Parliament itself. But they, having warning, had gone down the Thames by boat into the city of London, where they were too well loved for the king to dare attempt their capture. So Charles retired in dudgeon, and after that it was but a few months before there was open war between the army of the king and the army of the Parliament.

Now, when the war began, John Pym remained in London to direct the counsels of the Parliament, being already near sixty years old; and this he did with great wisdom and shrewdness until he died, about a year and a half after the war began. But John Hampden went at the head of a troop of horse which he had raised at his own cost, to be one of the leaders of the army of the Parliament in battle.

BRAVE JOHN HAMPDEN IS STRUCK DOWN BY A BULLET IN BATTLE

This was that John Hampden, of whom we have read on page 1038, who, when the king, ruling without Parliament, put an unlawful tax upon the people, refused to pay it, and was punished by the judges, who were afraid to give judgment against the king's will.

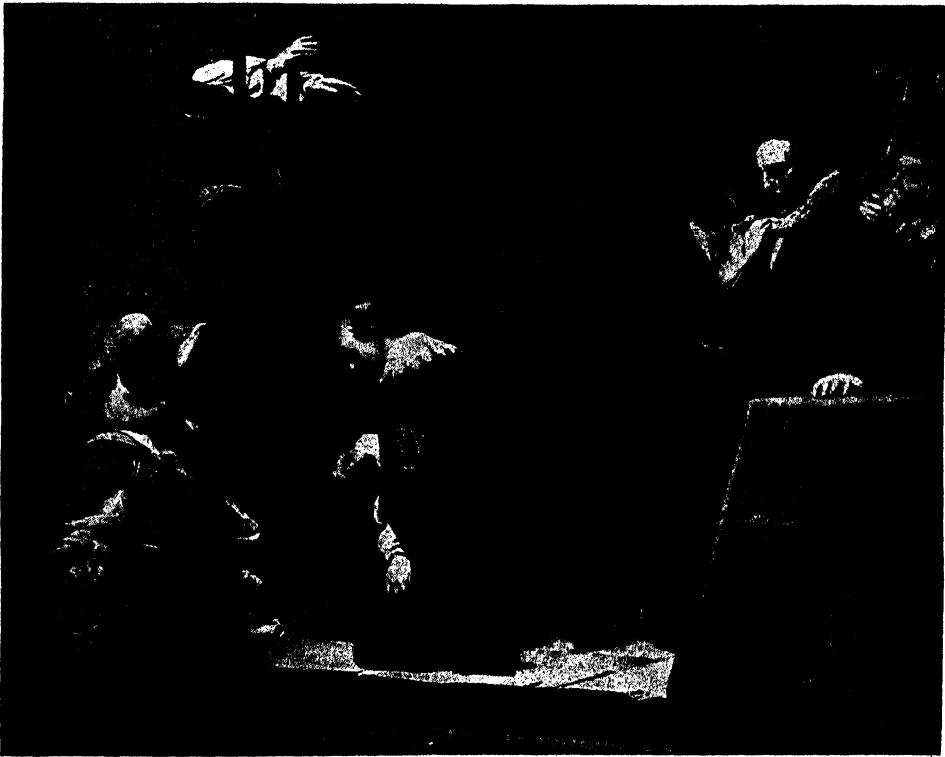
He was a man who tried always to do what he counted right, at whatever cost, so that even his foes honored him; and once it was said that it was only his coolness and wisdom which had restrained the king's party and the Parliament party within the House of Commons from falling upon each other even in the House itself. Therefore all men were grieved, even the king's men, who were now called Royalists or Cavaliers, when John Hampden was struck down by a bullet in the fight of Chalgrove Field; for they knew that when he died the chance was less than it had been that the two sides might yet find some way of agreement.

At the outset of the war, the greater part of the Parliament armies were made up of townsmen, who were brave enough,

but lacked skill in fighting ; and their leaders were noblemen, who would have been willing enough to make peace with the king and their own friends who were fighting on his side. But on the king's side were most of the country gentry and their tenants, practised swordsmen and horsemen. And on that side the leader of the cavalry was Prince Rupert of the Rhine, son of the king's sister who had been wedded to the Elector Palatine. It was Rupert's

stopping to plunder. So that it happened many times that, when they got back to the field of battle, the rest of the " Roundhead " army, as the Parliament army came to be called, had beaten off the rest of the Royalists. But it was not till Oliver Cromwell had trained the troopers, who were called the Ironsides, that Rupert fairly met his match ; for they charged each other in the great fight of Marston Moor, and Rupert's gallants were driven off the field.

ARCHBISHOP LAUD GIVING HIS LAST BLESSING TO STRAFFORD FROM HIS PRISON WINDOW



The Earl of Strafford and Archbishop Laud were great friends in their private lives, and colleagues in the government of England ; and they ruled the people as with an iron hand. In the early days of Charles the First, when the voice of the people began to be heard, Charles, while he was still king, suffered them both to be charged with treason and put to death. Strafford died first, and this picture shows him on his way to execution, passing by the window of Laud's prison, kneeling down to receive the old archbishop's blessing.

nephew who, many years afterwards, was known as King George I. In many ways Rupert was a good soldier of a great courage ; and when he led a charge of the Cavaliers, they were wont to be irresistible, sweeping all before them. But then the fiery Rupert often forgot that, when he had routed the ranks in front of him, it was time to halt his men and turn them against other of the enemy's troops ; and his men would go on pursuing and slaying, or

But then Cromwell halted his men, and drew them together and came back, and fell upon the other part of the Royalist army which was pressing the Roundheads hard, and so won the first great victory for the Parliament. Yet after that, at Naseby fight, Rupert made his old mistake of charging on, after breaking the opposing line ; and when he came back at last he found the whole of the Cavalier army scattered in utter rout. Afterwards, Rupert tried



STRAFFORD



LAUD



RUPERT



CAREY



MONTROSE



CHARLES THE FIRST

his hand as a sailor, and showed himself not less daring, and he also showed himself a keen student of science. He discovered a way of making drawings on metal by means of chemicals, so that a number of copies could be printed off, which is called mezzotint; and he is remembered for that, as well as for his fame as a dashing leader of cavalry.

But now let us look at two more Cavaliers. First see Lucius Carey, Lord Falkland. When first the Parliament met which was called the Long Parliament, he stood on the same side as Pym and Hampden, hoping that the king and the Parliament might both learn wisdom and come to agreement. But when he saw them growing month by month more bitterly at enmity, till the Parliament seemed to be grasping at the whole power, he went over to the king's side, fearing the tyranny of Parliament more than the tyranny of the king. He strove, however, to bring about peace between the two, though in that great crash of opposing wills there were none who would listen to counsels of gentleness. Therefore, in sadness of soul, Falkland chose loyalty before liberty; and when he was slain in battle, men said that he had died willingly.

The other is the hero of the Royalist cause in Scotland, James Graham of Montrose, whom men called the Great Marquis. Now he, like Falkland, was at the first on the side of the people against the king, but presently came to think that the leaders of the people would prove the more tyrannous of the two.

While in England the country was split in twain, in Scotland it seemed at first as if the king's cause were hopeless. Yet Montrose succeeded in gathering together some Highland clansmen; and so swiftly did he lead them from place to place, and so fierce was the onset of his men, that he won victory after victory over larger forces, and none could guess where he would strike his next blow. But at Philiphaugh his little army was shattered by a larger one under a skilful general, and so the Royalist cause was lost.

Nevertheless, when King Charles had been killed, Montrose made one more effort to win Scotland for Charles II. Once more, however, the odds against him were too great, and, wandering alone, he fell into the hands of an enemy whom he had counted a friend, and was tried for treason, and condemned to be hanged. But in all the war there was no leader more loved by his followers than the Great Marquis.



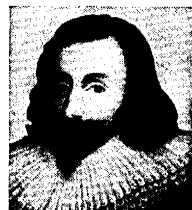
PYM



IRETON



HAMPDEN



ELIOT



BRADSHAW



OLIVER CROMWELL

THE NEXT STORIES OF MEN AND WOMEN BEGIN ON PAGE 2013.

The Book of POETRY

CHRISTINA ROSSETTI'S FAMOUS POEM

CHRISTINA GEORGINA ROSSETTI, a famous poetess and sister of the more famous Dante Gabriel Rossetti, poet and painter, was born on December 5, 1830, in London, and died there, December 29, 1894. "Goblin Market," published in 1862, was her first long poem and many attempts have been made to explain its "inner meaning." But it is simply a charming fairy fancy and has no inner meaning. Among her many books of verse there is one purely for little folk, entitled "Sing Song."

CONTINUED FROM PAGE 1802

GOBLIN MARKET

MORNING and evening
Maids heard the goblins cry

"Come buy our orchard fruits
Come buy, come buy :
Apples and quinces,
Lemons and oranges,
Plump unpecked cherries,
Melons and raspberries,
Bloom-down-cheeked peaches,
Swart-headed mulberries,
Wild free-born cranberries,
Crab-apples, dewberries,
Pine-apples, blackberries,
Apricots, strawberries ;—
All ripe together
In summer weather,
Morns that pass by,
Fair eves that fly ;
Come buy, come buy ;
Our grapes fresh from the vine,
Pomegranates full and fine,
Dates and sharp bullaces,
Rare pears and greengages,
Damsons and bilberries,
Taste them and try :
Currants and gooseberries,
Bright-fire-like barberries,
Figs to fill your mouth,
Citrons from the South,
Sweet to tongue and sound to eye ;
Come buy, come buy."

Evening by evening
Among the brookside rushes,
Laura bowed her head to hear,
Lizzie veiled her blushes ;
Crouching close together
In the cooling weather,
With clasping arms and cautioning lips
With tingling cheeks and finger tips
"Lie close," Laura said,
Pricking up her golden head :
"We must not look at goblin men,
We must not buy their fruits ;
Who knows upon what soil they fed
Their hungry thirsty roots ?"
"Come buy," call the goblins,
Hobbling down the glen.
"Oh," cried Lizzie, "Laura, Laura,
You should not peep at goblin men !"
Lizzie covered up her eyes,
Covered close lest they should look ;
Laura reared her glossy head,
And whispered like the restless brook :
"Look, Lizzie, look, Lizzie,
Down the glen tramp little men.
One hauls a basket

One bears a plate,
One lugs a golden dish
Of many pounds weight.
How fair the vine must grow
Whose grapes are so luscious ;
How warm the wind must blow
Through those fruit bushes."
"No," said Lizzie : "No, no, no ;
Their offers should not charm us,
Their evil gifts would harm us."
She thrust a dimpled finger
In each ear, shut eyes and ran :
Curious Laura chose to linger
Wondering at each merchant man.
One had a cat's face,
One whisked a tail,
One tramped at a rat's pace,
One crawled like a snail,
One like a wombat prowled obtuse and furry,
One like a ratel tumbled hurry skurry.
She heard a voice like voice of doves
Cooing all together :
They sounded kind and full of loves
In the pleasant weather.

Laura stretched her gleaming neck
Like a rush-imbedded swan,
Like a lily from the beck,
Like a moonlit poplar branch,
Like a vessel at the launch
When its last restraint is gone.

Backwards up the mossy glen
Turned and trooped the goblin men
With their shrill repeated cry :
"Come buy, come buy."
When they reached where Laura was
They stood stock still upon the moss,
Leering at each other,
Brother with queer brother ;
Signalling each other,
Brother with sly brother.
One set his basket down,
One reared his plate ;
One began to weave a crown
Of tendrils, leaves, and rough nuts brown
(Men sell not such in any town) ;
One heaved the golden weight
Of dish and fruit to offer her :
"Come buy, come buy," was still their cry.
Laura stared, but did not stir,
Longed but had no money ;
The whisk-tailed merchant bade her taste
In tones as smooth as honey,
The cat-faced purr'd
The rat-paced spoke a word

Of welcome, and the snail-paced even
was heard;
One parrot-voiced and jolly
Cried "Pretty Goblin" still for "Pretty
Polly";—
One whistled like a bird.

But sweet-tooth Laura spoke in haste,
"Good Folk, I have no coin;
To take were to purloin;
I have no copper in my purse,
I have no silver either,
And all my gold is on the furze
That shakes in windy weather
Above the rusty heather."
"You have much gold upon your head,"
They answered all together:
"Buy from us with a golden curl."
She clipped a precious golden lock,
She dropped a tear more rare than pearl,
Then sucked their fruit globes fair or red:
Sweeter than honey from the rock,
Stronger than man-rejoicing wine,
Clearer than water flowed that juice;
She never tasted such before,
How should it cloy with length of use?
She sucked and sucked and sucked the more
Fruits which that unknown orchard bore;
She sucked until her lips were sore;
Then flung the emptied rinds away,
But gathered up one kernel-stone,
And knew not was it night or day
As she turned home alone.

Lizzie met her at the gate
Full of wise upbraidings:
"Dear, you should not stay so late,
Twilight is not good for maidens;
Should not loiter in the glen
In the haunts of goblin men.
Do you not remember Jeanie,
How she met them in the moonlight,
Took their gifts both choice and many,
Ate their fruits and wore their flowers
Plucked from bowers
Where summer ripens at all hours?
But ever in the moonlight
She pined and pined away;
Sought them by night and day,
Found them no more, but dwindled
and grew grey;
Then fell with the first snow,
While to this day no grass will grow
Where she lies low;
I planted daisies there a year ago
That never blow.
You should not loiter so."
"Nay, hush," said Laura:
"Nay, hush, my sister:
I ate and ate my fill,
Yet my mouth waters still;
To-morrow night I will
Buy more;" and kissed her:
"Have done with sorrow;
I'll bring you plums to-morrow
Fresh on their mother twigs,
Cherries worth getting;
You cannot think what figs
My teeth have met in,
What melons icy-cold
Piled on a dish of gold
Too huge for me to hold,

What peaches with a velvet nap,
Pellucid grapes without one seed:
Odorous indeed must be the mead
Whereon they grow, and pure the wave
they drink

With lilies at the brink,
And sugar-sweet their sap."

Golden head by golden head,
Like two pigeons in one nest
Folded in each other's wings,
They lay down in their curtained bed:
Like two blossoms on one stem,
Like two flakes of new-fall'n snow,
Like two wands of ivory
Tipped with gold for awful kings.
Moon and stars gazed in at them,
Wind sang to them lullaby,
Lumbering owls forbore to fly,
Not a bat flapped to and fro
Round their rest:
Cheek to cheek and breast to breast
Locked together in one nest.

Early in the morning
When the first cock crowd his warning,
Neat like bees, as sweet and busy,
Laura rose with Lizzie:
Fetched in honey, milked the cows,
Aired and set to rights the house,
Kneaded cakes of whitest wheat,
Cakes for dainty mouths to eat,
Next churned butter, whipped up cream,
Fed their poultry, sat and sewed;
Talked as modest maidens should:
Lizzie with an open heart,
Laura in an absent dream,
One content, one sick in part;
One warbling for the mere bright day's
delight,

One longing for the night.

At length slow evening came:
They went with pitchers to the reedy brook;
Lizzie most placid in her look,
Laura most like a leaping flame.
They drew the gurgling water from its deep;
Lizzie plucked purple and rich golden flags,
Then turning homeward said: "The sunset
flushes

Those furthest loftiest crags;
Come, Laura, not another maiden lags,
No wilful squirrel wags,
The beasts and birds are fast asleep."
But Laura loitered still among the rushes
And said the bank was steep.

And said the hour was early still,
The dew not fall'n, the wind not chill;
Listening ever, but not catching
The customary cry,
"Come buy, come buy,"
With its iterated jingle
Of sugar-baited words:
Not for all her watching
Once discerning even one goblin
Racing, whisking, tumbling, hobbling;
Let alone the herds
That used to tramp along the glen,
In groups or single,
Of brisk fruit-merchant
men.

GOBLIN MARKET

Till Lizzie urged : " O Laura, come ;
I hear the fruit-call, but I dare not look !
You should not loiter longer at this brook :
Come with me home.
The stars rise, the moon bends her arc,
Each glowworm winks her spark,
Let us get home before the night grows dark ;
For clouds may gather
Though this is summer weather,
Put out the lights and drench us through ;
Then if we lost our way what should we do ? "

Laura turned cold as stone
To find her sister heard that cry alone.
That goblin cry,
" Come buy our fruits, come buy."
Must she then buy no more such dainty fruit ?
Must she no more such succous pasture find,
Gone deaf and blind ?
Her tree of life drooped from the root :
She said not one word in her heart's sore ache ;
But peering thro' the dimness, naught discerning,
Trudged home, her pitcher dripping all the way ;
So crept to bed, and lay
Silent till Lizzie slept ;
Then sat up in a passionate yearning,
And gnashed her teeth for baulked desire,
and wept
As if her heart would break.

Day after day, night after night,
Laura kept watch in vain
In sullen silence of exceeding pain.
She never caught again the goblin cry :
" Come buy, come buy ; "
She never spied the goblin men
Hawking their fruits along the glen :
But when the noon waxed bright
Her hair grew thin and grey ;
She dwindled, as the fair full moon doth turn
To swift decay and burn
Her fire away.

One day remembering her kernel-stone
She set it by a wall that faced the south ;
Dewed it with tears, hoped for a root.
Watched for a waxing shoot,
But there came none ;
It never saw the sun,
It never felt the trickling moisture run :
While with sunk eyes and faded mouth
She dreamed of melons, as a traveller sees
False waves in desert drouth
With shade of leaf-crowned trees,
And burns the thirstier in the sandful breeze.

She no more swept the house,
Tended the fowls or cows,
Fetched honey, kneaded cakes of wheat,
Brought water from the brook ;
But sat down listless in the chimney-nook
And would not eat.

Tender Lizzie could not bear
To watch her sister's cankerous care
Yet not to share.
She night and morning
Caught the goblin's cry :
" Come buy our orchard fruits,
Come buy, come buy : "

Beside the brook, along the glen,
She heard the tramp of goblin men,
The voice and stir
Poor Laura could not hear ;
Longed to buy fruit to comfort her,
But feared to pay too dear.
She thought of Jeanie in her grave,
Who should have been a bride ;
But who for joy brides hope to have
Fell sick and died
In her gay prime,
With the first glazing rime,
With the first snow-fall of crisp
winter time.

Till Laura dwindling
Seemed knocking at Death's door :
Then Lizzie weighed no more
Better and worse ;
But put a silver penny in her purse,
Kissed Laura, crossed the heath with
clumps of furze
At twilight, halted by the brook :
And for the first time in her life
Began to listen and look.

Laughed every goblin
When they spied her peeping :
Came towards her hobbling,
Flying, running, leaping,
Puffing and blowing,
Chuckling, clapping, crowing,
Clucking and gobbling,
Mopping and mowing,
Full of airs and graces,
Pulling wry faces,
Demure grimaces,
Cat-like and rat-like,
Ratel- and wombat-like,
Snail-paced in a hurry,
Parrot-voiced and whistler,
Helter skelter, hurry skurry,
Chattering like magpies,
Fluttering like pigeons,
Gliding like fishes—
Hugged her and kissed her ;
Squeezed and caressed her.
Stretched up their dishes,
Panniers, and plates ;
" Look at our apples
Russet and dun,
Bob at our cherries,
Bite at our peaches,
Citrons and dates,
Grapes for the asking,
Pears red with basking
Out in the sun,
Plums on their twigs ;
Pluck them and suck them,
Pomegranates, figs."

" Good folk," said Lizzie,
Mindful of Jeanie ;
" Give me much and many."

Held out her apron,
Tossed them her penny.
" Nay, take a seat with us,
Honour and eat with us,"
They answered grinning :
" Our feast is but beginning,
Night yet is early,



Warm and dew-pearly,
Wakeful and starry,
Such fruits as these
No man can carry;
Half their bloom would fly,
Half their dew would dry,
Half their flavour would pass by,
Sit down and feast with us,
Be welcome guest with us,
Cheer you and rest with us."

"Thank you," said Lizzie: "But one waits

At home alone for me.
So without further parleying,
If you will not sell me any
Of your fruits though much and many,
Give me back my silver penny
I tossed you for a fee."
They began to scratch their pates,
No longer wagging, purring,
But visibly demurring,
Grunting and snarling.
One called her proud,
Cross-grained, uncivil;
Their tones waxed loud,
Their looks were evil.
Lashing their tails
They trod and hustled her,
Elbowed and jostled her,
Clawed with their nails,
Barking, mewing, hissing, mocking,
Tore her gown and soiled her stocking,
Twisted her hair out by the roots,
Stamped upon her tender feet,
Held her hands and squeezed their fruits
Against her mouth to make her eat.

White and golden Lizzie stood,
Like a lily in a flood—
Like a rock of blue-veined stone
Lashed by tides obstreperously,
Like a beacon left alone
In a hoary roaring sea,
Sending up a golden fire,
Like a fruit-crowned orange-tree
White with blossoms honey-sweet
Sore beset by wasp and bee,
Like a royal virgin town
Topped with gilded dome and spire,
Close beleaguered by a fleet
Mad to tug her standard down.

One may lead a horse to water,
Twenty cannot make him drink.
Though the goblins cuffed and caught her,
Coaxed and fought her,
Bullied and besought her,
Scratched her, pinched her black as ink,
Kicked and knocked her,
Mauled and mocked her,
Lizzie uttered not a word:
Would not open lip from lip
Lest they should cram a mouthful in;
But laughed in heart to feel the drip
Of juice that syrped all her face,
And lodged in dimples of her chin,
And streaked her neck, which quaked like
curd.

At last the evil people,
Worn out by her resistance,
Flung back her penny, kicked their fruit
Along whichever road they took,

Not leaving root or stone or shoot;
Some writhed into the ground,
Some dived into the brook
With ring and ripple,
Some scudded on the gale without a sound,
Some vanished in the distance.

In a smart, ache, tingle,
Lizzie went her way;
Knew not was it night or day;
Sprang up the bank, tore thro' the furze,
Threaded copse and dingle,
And heard her penny jingle
Bouncing in her purse—
Its bounce was music to her ear.
She ran and ran
As if she feared some goblin man
Dogged her with gibe or curse
Or something worse.
But not one goblin skurried after,
Nor was she pricked by fear;
The kind heart made her windy-paced
That urged her home quite out of breath
with haste

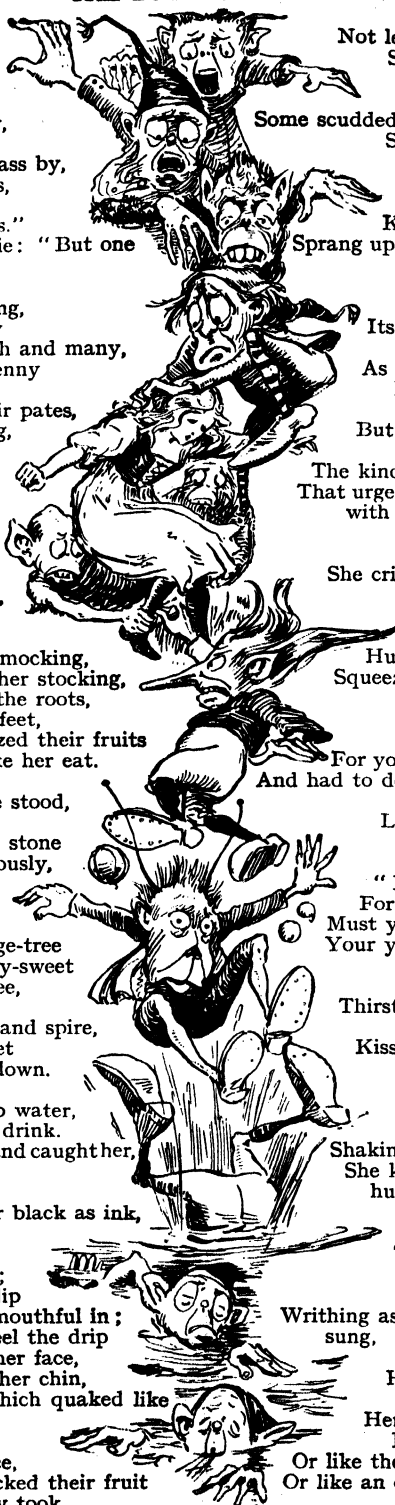
And inward laughter.

She cried, "Laura," up the garden,
"Did you miss me?
Come and kiss me.
Never mind my bruises,
Hug me, kiss me, suck my juices
Squeezed from goblin fruits for you,
Goblin pulp and goblin dew.
Eat me, drink me, love me;
Laura, make much of me;
For your sake I have braved the glen
And had to do with goblin merchant men."

Laura started from her chair,
Flung her arms up in the air,
Clutched her hair.
"Lizzie, Lizzie, have you tasted
For my sake the fruit forbidden?
Must your light like mine be hidden,
Your young life like mine be wasted,
Undone in mine undoing,
And ruined in my ruin,
Thirsty, cankered, goblin-ridden?"
She clung about her sister,
Kissed and kissed and kissed her:
Tears once again
Refreshed her shrunken eyes,
Dropping like rain
After long sultry drouth;
Shaking with anguish, fear, and pain,
She kissed and kissed her with a
hungry mouth.

Her lips began to scorch,
That juice was wormwood
to her tongue,
She loathed the feast:
Writhing as one possessed she leaped and
sung,

Rent all her robe, and wrung
Her hands in lamentable haste,
And beat her breast.
Her locks streamed like the torch
Borne by a racer at full speed,
Or like the mane of horses in their flight
Or like an eagle when she stems the light
Straight toward the sun,



Or like a caged thing freed,
Or like a flying flag when armies run,
Swift fire spread through her veins,
knocked at her heart,
Met the fire smouldering there
And overbore its lesser flame;
She gorged on bitterness without a name:
Ah! fool, to choose such part
Of soul-consuming care!
Sense failed in the mortal strife;
Like the watch-tower of a town
Which an earthquake shatters down,
Like a lightning-stricken mast,
Like a wind-uprooted tree
Spun about,
Like a foam-topped waterspout
Cast down headlong in the sea,
She fell at last;
Pleasure past and anguish past,
Is it death or is it life?

Life out of death.
The night long Lizzie watched by her,
Counted her pulse's flagging stir,
Felt for her breath,
Held water to her lips, and cooled her face
With tears and fanning leaves.
But when the first birds chirped about
their caves,
And early reapers plodded to the place
Of golden sheaves,
And dew-wet grass
Bowed in the morning winds so brisk to pass,
And new buds with new day
Opened of cup-like lilies on the stream,

Laura awoke as from a dream,
Laughed in the innocent old way;
Hugged Lizzie but not twice or thrice;
Her gleaming locks showed not one
thread of grey,
Her breath was sweet as May
And light danced in her eyes.

Days, weeks, months, years
Afterwards, when both were wives
With children of their own;
Their mother-hearts beset with fears,
Their lives bound up in tender lives;
Laura would call the little ones
And tell them of her early prime,
Those pleasant days long gone
Of not-returning time,
Would talk about the haunted glen,
The wicked, quaint fruit-merchant men,
Their fruits like honey to the throat
But poison in the blood;
(Men sell not such in any town),
Would tell them how her sister stood
In deadly peril to do her good,
And win the fiery antidote:
Then joining hands to little hands
Would bid them cling together,
"For there is no friend like a
sister
In calm or stormy weather;
To cheer one on the tedious
way,
To fetch one if one goes astray,
To lift one if one totters down,
To strengthen whilst one stands."



SIR SIDNEY SMITH

This merry song about Sir Sidney Smith, one of England's naval heroes, was written by Thomas J. Dibdin, a son of the more famous Charles Dibdin, who wrote "Tom Bowling."

GENTLEFOLKS, in my time I've made
many a rhyme,
But the song I now trouble you with
Lays some claim to applause, and you'll grant
it because
The subject's Sir Sidney Smith, it is;
The subject's Sir Sidney Smith.

We all know Sir Sidney, a man of such
kidney,
He'd fight every foe he could meet;
Give him one ship or two, and without more
ado,
He'd engage if he met a whole fleet, he
would;
He'd engage if he met a whole fleet.

Thus he took, every day, all that came in his
way,
Till fortune, that changeable elf,
Order'd accidents so, that, while taking the
foe,
Sir Sidney got taken himself, he did;
Sir Sidney got taken himself.

His captors, right glad of the prize they now
had,
Rejected each offer we bid,

And swore he should stay, lock'd up till
doomsday,
But he swore he'd be hang'd if he did, he
did;
But he swore he'd be hang'd if he did.

So Sir Sid. got away, and his gaoler next day
Cried, "Sacre, diable, morbleu!
Mon prisonnier 'scape, I 'ave got in von
scrape,
And I fear I must run away, too, I must;
I fear I must run away, too."

THE RAINBOW

John Keble, the writer of this tiny but beautiful poem, was a celebrated poet and a clergyman. He lived from 1792 till 1866, and was professor of poetry at Oxford University, where Keble College was erected as a memorial to him.

A FRAGMENT of a rainbow bright
Through the moist air I see,
All dark and damp on yonder height,
All bright and clear to me.

An hour ago the storm was here,
The gleam was far behind,
So will our joys and grief appear,
When earth has ceased to blind.

Grief will be joy if on its edge
Fall soft that holiest ray,
Joy will be grief if no faint pledge
Be there of heavenly day.

BATTLE OF THE BALTIC

The battle of the Baltic was fought in April 1802, and the heroism of Nelson was the great feature of this famous sea-fight. Sir Hyde Parker commanded the English fleet, and Captain Edward Riou was killed while in command of a squadron. This stirring poem was written by Thomas Campbell.

OF Nelson and the North
Singing the glorious day's renown,
When to battle fierce came forth
All the might of Denmark's crown,
And her arms along the deep proudly
shone;
By each gun the lighted brand
In a bold determined hand,
And the Prince of all the land
Led them on.

Like leviathans afloat
Lay their bulwarks on the brine;
While the sign of battle flew
On the lofty British line:
It was ten of April morn by the chime:
As they drifted on their path
There was silence deep as death;
And the boldest held his breath
For a time.

But the might of England flush'd
To anticipate the scene;
And her van the fleetest rush'd
O'er the deadly space between.
"Hearts of oak!" our captains cried,
when each gun
From its adamant lips
Spread a death-shade round the ships,
Like the hurricane eclipse
Of the sun.

Again! again! again!
And the havoc did not slack,
Till a feeble cheer the Dane
To our cheering sent us back;—
Their shots along the deep slowly boom:
Then ceased—and all is wail
As they strike the shatter'd sail;
Or in conflagration pale
Light the gloom.

Out spoke the victor then
As he hail'd them o'er the wave,
"Ye are brothers! ye are men!
And we conquer but to save:
So peace instead of death let us bring:
But yield, proud foe, thy fleet
With the crews, at England's feet,
And make submission meet
To our King."

Then Denmark blest our chief
That he gave her wounds repose;
And the sounds of joy and grief
From her people wildly rose,
As death withdrew his shades from the
day:
While the sun look'd smiling bright
O'er a wide and woeful sight,
Where the fires of funeral light
Died away.

Now joy, old England, raise!
For the tidings of thy might,
By the festal cities' blaze,
Whilst the wine-cup shines in light;

And yet, amidst that joy and uproar,
Let us think of them that sleep
Full many a fathom deep
By thy wild and stormy steep,
Elsinore!

Brave hearts! to Britain's pride
Once so faithful and so true,
On the deck of fame that died
With the gallant good Riou:
Soft sigh the winds of heaven o'er their grave!
While the billow mournful rolls,
And the mermaid's song condoles,
Singing, Glory to the souls
Of the brave!

LUCY GRAY

In this well-known ballad by William Wordsworth the awful sense of solitude and the terror of the dark days of winter on the lonely moors are suggested with the most dramatic effect, although it is written in a simple and direct manner.

OF I had heard of Lucy Gray:
And, when I cross'd the wild,
I chanced to see at break of day
The solitary child.

No mate, no comrade Lucy knew;
She dwelt on a wide moor,
The sweetest thing that ever grew
Beside a human door!

You yet may spy the fawn at play,
The hare upon the green;
But the sweet face of Lucy Gray
Will never more be seen.

"To-night will be a stormy night—
You to the town must go;
And take a lantern, Child, to light
Your mother through the snow."

"That, Father, will I gladly do:
'Tis scarcely afternoon—
The minster-clock has just struck two,
And yonder is the moon!"

At this the father raised his hook,
And snapp'd a faggot band;
He plied his work;—and Lucy took
The lantern in her hand.

Not blither is the mountain roe:
With many a wanton stroke
Her feet disperse the powdery snow,
That rises up like smoke.

The storm came on before its time:
She wander'd up and down;
And many a hill did Lucy climb:
But never reach'd the town.

The wretched parents all that night
Went shouting far and wide;
But there was neither sound nor sight
To serve them for a guide.

At daybreak on a hill they stood
That overlook'd the moor;
And thence they saw the bridge of wood,
A furlong from their door.

They wept—and, turning homeward, cried:
"In heaven we all shall meet!"
When in the snow the mother spied
The print of Lucy's feet.

Then downwards from the steep hill's
edge

They track'd the footmarks small ;
And through the broken hawthorn hedge,
And by the long stone wall :

And then an open field they cross'd :
The marks were still the same ;
They track'd them on, nor ever lost ;
And to the bridge they came.

They follow'd from the snowy bank
Those footmarks, one by one,
Into the middle of the plank ;
And further there were none !

Yet some maintain that to this day
She is a living child ;
That you may see sweet Lucy Gray
Upon the lonesome wild.

O'er rough and smooth she trips along,
And never looks behind ;
And sings a solitary song
That whistles in the wind.

BY THE SEA

The peace and tranquility of the sea, as well as its grandeur, are shown forth in this little selection from the beautiful poems of William Wordsworth, the English poet of nature.

IT is a beauteous evening, calm and free ;
The holy time is quiet as a nun
Breathless with adoration ; the broad sun
Is sinking down in its tranquillity.

The gentleness of heaven is on the sea ;
Listen ! the mighty Being is awake,
And doth with his eternal motion make
A sound like thunder—everlastingly.

Dear child ! dear girl ! that walkest with me
here,
If thou appear untouch'd by solemn thought
Thy nature is not therefore less divine.

Thou liest in Abraham's bosom all the year,
And worshipp'st at the temple's inner shrine,
God being with thee when we know it not.

SNOW-FLAKES

Henry Wadsworth Longfellow has written many beautiful poems, but none with a lighter touch than "Snow-Flakes." It makes us imagine that we actually feel the snow falling.

OUT of the bosom of the air,
Out of the cloud-folds of her garments
shaken,
Over the woodlands brown and bare,
Over the harvest fields forsaken,
Silent and soft and slow,
Descends the snow.

Even as our cloudy fancies take
Suddenly shape in some divine expression,
Even as the troubled heart doth make
In the white countenance confession,
The troubled sky reveals
The grief it feels.

This is the poem of the air,
Slowly in silent syllables recorded ;
This is the secret of despair,
Long in its cloudy bosom hoarded,
Now whispered and revealed
To wood and field.

GOD MOVES IN A MYSTERIOUS WAY

William Cowper wrote this beautiful hymn, which is sung in many churches. His wonderful genius speaks to us through this poem as through a number of his other works.

GOD moves in a mysterious way
His wonders to perform ;
He plants His footsteps in the sea,
And rides upon the storm.

Deep in unfathomable mines
Of never-failing skill
He treasures up His bright designs,
And works His sovereign will.

Ye fearful saints, fresh courage take !
The clouds ye so much dread
Are big with mercy, and shall break
In blessings on your head.

Judge not the Lord by feeble sense,
But trust Him for His grace ;
Behind a frowning providence
He hides a smiling face.

His purposes will ripen fast,
Unfolding every hour ;
The bud may have a bitter taste,
But sweet will be the flower.

Blind unbelief is sure to err,
And scan His work in vain ;
God is His own interpreter,
And He will make it plain.

ELEGY ON THE DEATH OF A MAD DOG

This amusing poem, by Oliver Goldsmith, is one of several that occur in the course of his famous story "The Vicar of Wakefield," and it serves to remind us that it is not always what we think is most likely to happen that comes to pass.

GOOD people all, of every sort,
Give ear unto my song ;
And if you find it wondrous short
It cannot hold you long.

In Islington there was a Man,
Of whom the world might say,
That still a godly race he ran—
Whene'er he went to pray.

A kind and gentle heart he had,
To comfort friends and foes ;
The naked every day he clad,—
When he put on his clothes.

And in that town a Dog was found,
As many dogs there be,
Both mongrel, puppy, whelp, and hound,
And curs of low degree.

This Dog and Man at first were friends ;
But when a pique began,
The Dog, to gain some private ends,
Went mad, and bit the Man.

Around from all the neighbouring streets
The wondering neighbours ran,
And swore the Dog had lost his wits,
To bite so good a Man !

The wound it seem'd both sore and sad
To every Christian eye :
And while they swore the Dog was mad,
They swore the Man would die.

But soon a wonder came to light,
That show'd the rogues they lied :—
The Man recover'd of the bite,
The Dog it was that died !

NURSE'S SONG

William Blake proves in this little song how closely he must have observed the things he sings about so clearly. Notice the sixth line of the first verse, and look at what we have said in the note to Wordsworth's "Pet Lamb" on page 1925.

WHEN the voices of children are heard on the green,

And laughing is heard on the hill,
My heart is at rest within my breast,
And everything else is still.

Then come home, my children, the sun is gone down,

And the dew of night arise ;
Come, come, leave off play, and let us away
Till the morning appears in the skies.

"No, no, let us play, for it is yet day,
And we cannot go to sleep ;

Besides, in the sky the little birds fly,
And the hills are all covered with sheep."

Well, well, go and play till the light fades away,

And then go home to bed.—
The little ones leap'd, and shouted, and laugh'd ;
And all the hills echo'd.

THE WORM

In the simplicity of the following little piece there is the very essence of Christian teaching, the poet who wrote it being famous as a philosopher and preacher. His name was Thomas Gisborne, and he was born in 1758 and died in 1846.

TURN, turn thy hasty foot aside,
Nor crush that helpless worm !
The frame thy wayward looks deride
Required a God to form.

The common lord of all that move,
From whom thy being flow'd,
A portion of His boundless love
On that poor worm bestow'd.

The sun, the moon, the stars, He made
For all His creatures free ;
And spread o'er earth the grassy blade,
For worms as well as thee.

Let them enjoy their little day
Their humble bliss receive ;
O ! do not lightly take away
The life thou canst not give !

JOCK OF HAZELDEAN

This ballad by Sir Walter Scott has long been one of the most popular in Scotland, and tells of a country lass who preferred to run away with a poor man whom she loved, and to marry him rather than the rich bridegroom chosen for her. It contains many Scotch words, but they are easy to understand.

"WHY weep ye by the tide, ladie ?
Why weep ye by the tide ?
I'll wed ye to my youngest son,
And ye sall be his bride :
And ye sall be his bride, ladie,
Sae comely to be seen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.

"Now let this wilfu' grief be done,
And dry that cheek so pale ;
Young Frank is chief of Errington,
And lord of Langley-dale ;
His step is first in peaceful ha',
His sword in battle keen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.

"A chain of gold ye sall not lack,
Nor braid to bind your hair,
Nor mettled hound, nor managed hawk
Nor palfrey fresh and fair ;
And you the foremost o' them a'
Sall ride our forest-queen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.

The kirk was deck'd at morning-tide,
The tapers glimmer'd fair ;
The priest and bridegroom wait the bride,
And dame and knight are there :
They sought her baith by bower and ha' ;
The ladie was not seen !
She's o'er the Border, and awa'
Wi' Jock of Hazeldean.

THE ARMING OF PIGWIGGEN

Michael Drayton was one of the many poets who lived in the time of Queen Elizabeth. He wrote beautiful descriptions of English scenery and country life. One of his most remarkable works was a description of "The Court of Fairy," full of fancy and imagination. Pigwigen was a fairy who was in love with Queen Mab, and in the following verses from Drayton's long poem the arming of Pigwigen is described.

HE quickly arms him for the field—
A little cockle-shell his shield,
Which he could very bravely wield,
Yet could it not be pierc'd ;
His spear a bent both stiff and strong,
And well near of two inches long ;
The pile was of a horse-fly's tongue,
Whose sharpness naught revers'd.

And put him on a coat of mail,
Which was of a fish's scale,
That when his foe should him assail,
No point should be prevailing.
His rapier was a hornet's sting,
It was a very dangerous thing ;
For if he chanced to hurt the king,
It would be long in healing.

His helmet was a beetle's head,
Most horrible and full of dread,
That able was to strike one dead,
Yet it did well become him ;
And for a plume a horse's hair,
Which, being tossed up by the air,
Had force to strike his foe with fear,
And turn his weapon from him.

Himself he on an earwig set,
Yet scarce he on his back could get,
So oft and high he did curvet
Ere he himself could settle :
He made him turn, and stop, and bound,
To gallop and to trot the round,
He scarce could stand on any ground,
He was so full of mettle.

TRUE GROWTH

There is much wisdom compressed into these ten short lines of verse by the great Elizabethan poet Ben Jonson. The last line but one might also be applied to the little poem itself.

IT is not growing like a tree
In bulk, doth make Man better be ;
Or standing long an oak, three hundred year,
To fall a log at last, dry, bald, and sere :
A lily of a day
Is fairer far in May,
Although it fall and die that night—
It was the plant and flower of Light !
In small proportions we just beauties see ;
And in short measures life may perfect be.

A CRADLE SONG

As we saw on page 1059, so great a poet as Lord Tennyson could devote his genius to the writing of a sweet little song for mothers to sing by baby's cradle. Here is another from his pen, pure and simple as baby itself. We should always bear in mind that a true poet does not despise the little things although he is able to write of the great ones.

WHAT does little birdie say
In her nest at peep of day ?
Let me fly, says little birdie,
Mother, let me fly away.
Birdie, rest a little longer,
Till the little wings are stronger.
So she rests a little longer,
Then she flies away.

What does little baby say
In her bed at peep of day ?
Baby says, like little birdie,
Let me rise and fly away.
Baby, sleep a little longer,
Till the little limbs are stronger,
If she sleeps a little longer,
Baby too shall fly away.

* THE TERRIBLE BALL

Mary Mapes Dodge is a clever American writer of children's stories and poems. This is one of her humorous story-poems, which behind its fun has a lesson for us in reminding us that a little mischief may grow bigger than was originally intended, and may ultimately get beyond our control. It is taken from her charming book "Rhymes and Jingles," by permission of Messrs. Charles Scribner's Sons, New York

GIVE me your ear, good children all,
I'm going to set up a terrible ball--
A terrible ball that began to grow
From only the least little speck of snow.
And, to make the lesson pointed and plain,
I'll just remark that life, in the main,
Is, etcetera--you know; and I hope you'll be
good

In future to show that you've understood.

Three lovely, little artless boys,
All of them being mothers' joys,
One day decided, in innocent mirth,
To make a snowball as big as the earth.
What makes the story more touching still,
The big-eyed schoolhouse on the hill
Was in session, under the cross Miss Stookey,
And these little boys were "playing hookey."
Hookey from Stookey, they worked with a
will,
The ball grew bigger--and bigger still.

Then, like a pumpkin fair and round,
They kept it rolling on the ground--
Bigger, bigger, bigger, bigger,
Bigger, bigger, bigger, bigger !
The boys could hardly push it along,
It steadily grew so stout and strong.

Now, this mammoth ball, that began as a pill,
Was made, you must know, on top of a hill ;
This hill was so terribly steep and high,
That even the coasters would pass it by ;
And, saving a road by the cattle made,
It sloped right down, at a fearful grade,
To the meadow, where stood a cottage red
Where these little children were born and bred.

"Halloo !" they cried, "let's have some fun,
There's Stookey's pig as sure as a gun !"
"Hooray ! hooray !" cried the children three,
Thus giving vent to their youthful glee.

* From "Rhymes and Jingles," copyright, 1874, 1904, by Charles Scribner's Sons.

When--what do you think?--this ungrateful pill,
That they'd made so big on top of the hill,
With an air that said, "Now, I think I've
got 'em !"
Resolved to roll all the way to the bottom.

The ball was swift, the tall was big,
Alas for Stookey's innocent pig !
Alas for lovers who walked that way,
They ne'er in their lives forgot the day !
Alas for the learned Professor Gath,
Who happened to stroll in the snowball's path !
And alas, alas, for those children three,
Who shouted and cheered in their pretty glee !

Rolling, growing, demolishing all,
On and on went the terrible ball ;
It left the cattle down on their knees,
It crushed the fences and bent the trees ;
Even the haystacks went ker-flop.
It wouldn't turn, and it wouldn't stop,
But still rolled on in steady motion,
Making a bee-line for the ocean !

With laugh and shout and merry hoot,
Those children followed in glad pursuit.
"Hooray ! hooray !" they cried again,
And then gave chase with might and main ;
They gave it chase with main and might,
But the terrible ball rolled out of sight.

And now comes the saddest part of all.
(Oh, that cruel, wicked, terrible ball !)
When at last the three little artless boys,
Tired of running and making a noise,
All resolved to go home to bed,
Where, oh ! where was that cottage red ?
Where, oh ! where ? As the terrible ball--
Never a home had those children small.
Gone, clean gone ! with picket and paling--
And all their joy was turned to wailing !

MORAL

Hence it is, and so we see
Thus and so, it seems to me,
As I'm sure you'll all agree,
And ever after, better be.

SLEEP, BEAUTY BRIGHT

William Blake, the strange and mystic poet, as we have seen, could write simple lays of country life, and here we have him crooning a pretty little cradle song tender as a mother's, except that in the last lines he has a sudden fear for the dangers of life which the child, as it grows older, will have to face.

SLEEP, sleep, beauty bright,
Dreaming in the joys of night ;
Sleep, sleep ; in thy sleep
Little sorrows sit and weep.

Sweet babe, in thy face
Soft desires I can trace,
Secret joys and secret smiles,
Little pretty infant wiles.

As thy softest limbs I feel,
Smiles as of the morning steal
O'er thy cheek, and o'er thy breast
Where thy little heart doth rest.

Oh, the cunning wiles that creep
In thy little heart asleep !
When thy little heart doth wake,
Then the dreadful light shall break.

LITTLE VERSES FOR VERY LITTLE PEOPLE



PEMMY was a pretty girl,
But Fanny was a better;
Pemmy look'd like any churl,
When little Fanny let her.



Pemmy had a pretty nose,
But Fanny had a better;
Pemmy oft would come to blows,
But Fanny would not let her.

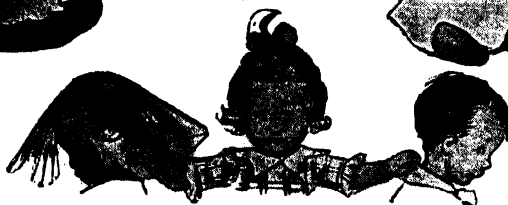
Pemmy had a pretty doll,
But Fanny had a better;
Pemmy chattered like a poll,
When little Fanny let her.



Pemmy had a pretty song,
But Fanny had a better;
Pemmy would sing all day long,
But Fanny would not let her.



Pemmy loved a pretty lad,
And Fanny loved a better;
And Pemmy wanted for to
wed,
But Fanny would not let her.



S.B.P.



WHAT MAKES THE RAINBOW?

THE rainbow is made by drops of rain; it is due to the reflection of sunlight from drops of water hanging in the sky. As the sunlight passes through the raindrop, and is reflected from the inside of the back of the raindrop, it is broken up into its various parts, which correspond to the various colors of the rainbow.

White light, we know, is a mixture of many colors. The light waves corresponding to these colors differ in the extent to which they are bent by passing through such a thing as a raindrop, and so, when they come out of it, they are sorted out, so to speak; and what was white light on going in, comes out as a band of several colors. Thus, what we see in the rainbow is really a natural spectrum of sunlight—the light spread out in a band of the various colors that make it up.

WHERE DOES THE RAINBOW END?

As we trace the rainbow down on each side it seems to touch the earth, and there are stories of children who have set out to find the end of the rainbow. But the rainbow ends nowhere, for it is a mere appearance in the sky, due to tiny drops of water, and it “ends,” if we are to use that word, simply where the drops of water end that are so placed

CONTINUED FROM 1796



as to reflect the sunlight in this way to our eyes. Really no two people see exactly the same rainbow. They could not do so, unless their eyes were in the same place. And as we move, the bow we see moves with us.

WHY IS THE AIR FRESHER AFTER IT HAS BEEN RAINING?

There are several answers to this question. For one thing, the rain washes the air, as water will wash anything else. If the air has contained a number of smoke particles, as it does in large cities, the rain has reduced their numbers by carrying them down with it as it fell through the air. Thus the rain helps to rid the air of the sulphurous and other gases which are given off by these smoke particles. Then again, it now seems that the falling of rain often, or always, depends in part on electrical charges in the air, and these charges may help to produce small quantities of the gas called ozone, a sort of variety of oxygen, which has a fresh smell of its own. Then, rain cleans the roads, and washes away all sorts of things which give off smells. We do not realize the extent to which rain is a cleanser in cities; and we must remember that our noses are usually only a few feet above the surface of the street, so that they are fully exposed to

whatever arises from them. A few hundred feet up, the air would smell very differently.

WHY DO THE FLOWERS SMELL SWEETER AFTER RAIN?

Where there is any vegetation rain has a great influence in making the air smell fresher, for water has a special power upon the activity of many kinds of vegetable life that produce pleasant scents. We say that the rain brings out the fragrance of the flowers, and that is true. All life requires water, and all the processes of living creatures are helped by a good supply of water. When rain falls on flowers, and on many kinds of leaves, it sets going the chemical changes which result in the production of many pleasant odors which are added to the air, and so help to make it smell "fresh." We often think that rain is a nuisance, for it interferes with many of our pleasures, and we tell it to "go to Spain" and "never come back again"; but if it took our advice we should soon have to go to Spain after it.

COULD WE LIVE WITHOUT RAIN?

I sometimes think, said the Wise Man, that it would be nice if all the rain could fall at night, for it is just as useful then, and interferes with few people; but, whether on holidays, or at night when we are all in bed and asleep, rain we certainly must have. The good of it is that it soaks into the soil and is sucked up by the roots of plants, which must have it if they are to live. If there were no rain there would be life only in the sea. In parts of the world where there is no rain there is no life. In this fortunate country we have no idea, just because we are so well off, how rain is loved and treasured and prayed for in other countries where there is not enough of it, or where it falls only at certain seasons of the year.

We "do not know when we are well off" in this country; and especially the people who live in towns, upon the food which is made in the country by the rain that falls there, do not know how good rain is, and how impossible our lives would be without it. We must think of rain, then, as something that cleans and washes the air, nourishes the vegetable life upon which our own life depends, and ensures a supply of fresh water all

the year round in every part of the world where sufficient rain falls.

IS GREAT BRITAIN'S CLIMATE A GOOD ONE?

The climate of Great Britain is certainly not the worst in the world, although its people are always complaining of it. For one thing, they have a splendid supply of air-cleansing and life-giving rain, and can hardly guess what a famine of water means, or even that there could be such a thing. And the rain does not come all at one time of year, which in some parts of the world they call "the rainy season," interfering with everything when it comes, and then requiring to be stored up very laboriously until the next "rainy season"; but it comes in fair quantities all the year round.

IS THEIR WEATHER DUE TO THE FACT THAT THEY LIVE ON AN ISLAND?

The fine supply of rain that they have in Great Britain is due mainly to the fact that it is an island entirely surrounded by the sea, from which the sun can daily draw a supply of moisture to distribute over all the land, perhaps at once, perhaps a little later. The water surrounding the island not only supplies through the sun-power the rain that is needed, but its power of storing heat keeps the climate very equable, as it is called—or equal, as the word simply means.

In the summer the sea takes much heat from land and air, and so prevents the climate from getting so hot as to compel the people for several hours of every day having to stop work and stay indoors in discomfort; and in the winter the sea gives to air and land the heat of the past summer, and so prevents the climate from getting very cold. There are two great kinds of climates in the world, island or insular climates, and continental climates. The first are usually considered to be the best, for the reasons we have seen. Continental climates differ just because of the absence of the encircling sea and what it does for the land and air in winter and in summer.

WHY IS THE CENTRE OF A GAS-FLAME BLUE AND THE OUTSIDE YELLOW?

The color of a burning or a hot thing depends very largely on its temperature. A white-hot poker is hotter than a red-hot one; and a white-hot star like Sirius is hotter than a red-hot one like Aldebaran or the sun. The outside of a flame is very much hotter than the

inside, and gives out a brighter light in consequence—like a hot star or a hot poker. Also the metal sodium, when hot, gives a yellow color, and sodium is scattered everywhere. But the sodium in the gas is not hot enough to glow except in the outer part of the flame. If you have a carefully arranged flame, you may hold a match in the centre of it without the match taking fire.

Now you will ask me why the inside of the flame is colder than the outside, and the answer is easy. The outside of the flame is the part next the air—next the oxygen—which causes the burning. The inside of the flame has to be content with the very small amount of oxygen which gets to it, still unused, through the outer part of the flame. Where the burning is fastest and most complete, there the heat is greatest, and therefore the outside of the flame is hottest.

WHAT IS IT THAT HAPPENS WHEN WE GET TIRED?

The special word for feeling tired is *fatigue*, and this state of the body, as it often is, and of the mind, as it often is too, has been very carefully studied during the last few years, by many scientific men. We have learned a great many very interesting and useful things about it.

We know that the power and energy of the body come from our food; and so the first idea of the cause of tiredness or fatigue was that it was due to the need for more food. The tired person, people thought, had used up his food and needed more; just as a railway engine might be said to get "tired" if the fireman forgot to supply it with plenty of coal. If this were true, the more utterly exhausted and tired out a man was, the bigger the meal that he should take in order to make him feel fresh again.

But we have learned that this old idea was utterly wrong. The body always contains so large a supply of food material or fuel that a man gets tired, for some other reason, long before he has nearly used it up. Also we have learned that, in the state of fatigue, it is not possible to digest one's food properly, and therefore that to give a large meal to an exhausted person is very bad indeed for him. He is not fit to use it, and it only upsets him. We should eat only very slightly and carefully, if at all, when we are very tired. The best thing for fatigue is rest, and the best kind of rest is sleep.

WHY DO WE GET TIRED?

The answer is that weariness or fatigue is due wholly to the poisoning of the brain and the nerves by all sorts of things which are produced in our bodies as the result of work; or perhaps sometimes, as most children know, as the result of too much exposure to sun and heat.

Every day's work, if it is at all hard, produces rather more of these poisonous things than we can quite get rid of as we go on working; and these things really help us, at night, to go to sleep. During good sleep they are all got rid of, and we wake refreshed.

It is easy to show that this new discovery about tiredness is true. We can take a small quantity of blood from a tired animal, such as a dog, without hurting it, and can give this to another dog that is not tired. The second dog at once shows all the signs of a dog that has run a long way and is quite tired out. The poisons produced in the body of the first dog and carried in its blood have got into the blood of the second dog, and it, too, feels tired.

WHAT IS THE BEST CURE FOR TIREDNESS?

The answer to the last question guides us in answering this one. We must not take a large meal when we are tired, because we are not then fit to deal with food. We may take water, or lemonade, or oranges, because water, in passing through the body, always carries all sorts of poisons away with it and helps us to get rid of them.

But, above all, we must rest, and there is no kind of rest which can be compared with sleep. In general, the people who sleep best are those who work hard. The man who works all day in the fields usually has the best sleep in the world, far better than some unfortunate people who do very little or nothing, and who may even take medicine to help them to sleep. Nature, the best of all doctors, has her own medicine to procure good sleep for every healthy person who works; and the most beautiful thing about tiredness, when it is the right, "nice" tiredness that everyone should feel when he goes to bed, is that it produces in our blood just the very thing that gives us perfect and natural sleep. Perhaps we shall soon be able to find this thing, and learn how to make it. Then we shall be

able to give just the right quantities of it to make ill people well.

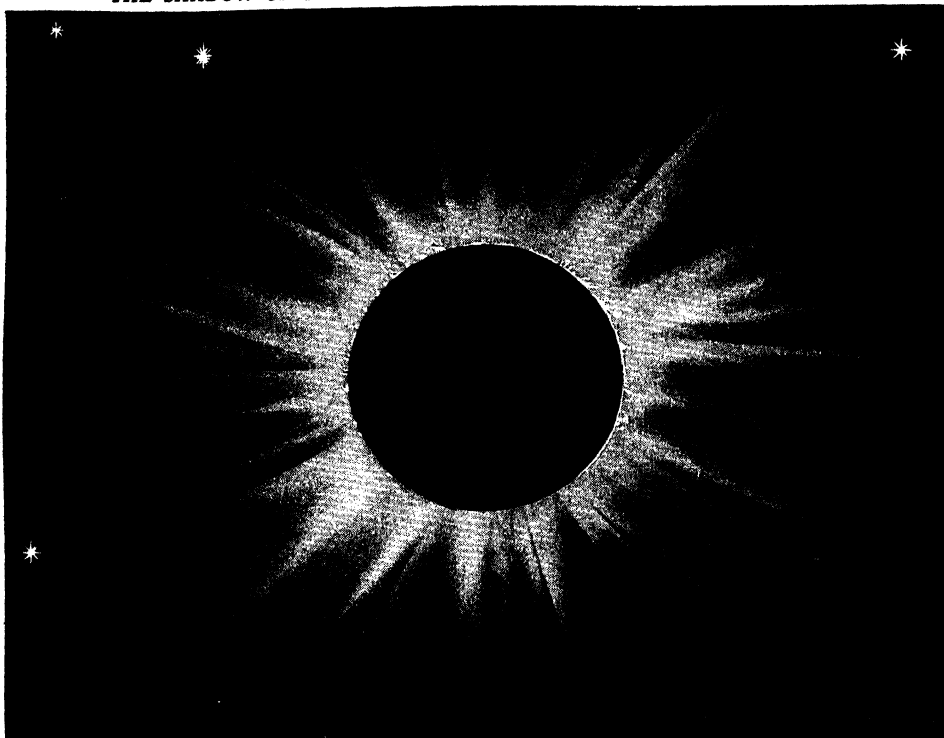
WHAT MAKES THE SHADOWS THAT GO UP AND DOWN HILLS?

The shadows that we see crossing the face of the hills are the shadows of clouds. They can be seen passing over the sea, too, or running across the field of play when you watch a game of baseball. They are best seen when there are small clouds quickly moving, and with well-marked edges, passing across the sun, as it seems to us, on a bright

other, which men have noticed at times in all ages, and which has often made them very much afraid. This is the shadow of the earth itself, and it is thrown upon the moon. It sometimes happens that the earth just gets in the way of the light from the sun which would fall upon the moon if the earth were not there. And so we get what we call an eclipse of the moon. As we watch the moon, we can see a round shadow beginning to creep across it.

Sometimes it passes over only part of

THE SHADOW OF THE MOON BLOTING OUT THE FACE OF THE SUN



This is one of the most impressive sights that men have ever seen—the moon passing across the face of the sun. It happens sometimes that the moon gets directly in the way of the sunlight which would fall upon the earth if the moon were not there, and we call this an eclipse, or covering up, of the sun.

day. Sometimes they move more quickly than at other times. This depends partly on the wind, which varies very much in speed, and on the height of the clouds. Often, if you watch these shadows, you can see the whole shape of a cloud that makes one, and, of course, often such a shadow passes where we are standing.

WHAT IS THE BIGGEST SHADOW THAT WE CAN SEE?

There is one great shadow, thousand and thousands of times bigger than any

the moon; sometimes it covers the whole moon for a little while, and we call that a total eclipse of the moon. When we watch this shadow—one does not even need a glass to see it with—it is easy to see that the shadow is curved. It is the shadow of a round thing, and this is one of the proofs that the earth is really round. In olden days men used to be very much afraid of eclipses of the moon and of the sun. They used to think that it was a warning of something awful that was to happen. But

now we know that an eclipse of the moon is nothing more than just the throwing of a great shadow upon the moon's face, and that is the shadow of the earth, by far the greatest shadow that anyone can ever see.

WHAT MAKES AN ECLIPSE OF THE SUN?

The kind of eclipse that used to frighten people most is an eclipse of the sun. It does not often happen that the sun is totally eclipsed, but when this does happen on a bright day the effect is very wonderful. It suddenly becomes dark, until it is like night; it turns cold; the dew falls; the birds go to roost; the flowers go to sleep; all this, perhaps, in the middle of the day, and with not a cloud in the sky. Then, just as suddenly the daylight all comes back again. An eclipse of the sun is not due to a shadow, but happens when the moon gets between the earth and the sun, and we see the moon pass across the sun.

This happens quite often, but it is not often that the moon passes across in such a way that, for a little while, it exactly fits over the sun, and cuts off all his light. Those are the startling times. We know beforehand when they are to happen, and to what parts of the world we must go to see them, and exactly how long the period of real darkness will last. Great preparations are made, and men go with telescopes and cameras and all sorts of other instruments, perhaps to Greenland, perhaps to some tiny island in the Pacific Ocean, just for the sake of the forty seconds, or perhaps it may be as much as four minutes, during which the moon will exactly fit over the face of the sun. For we can see things and learn things about the sun during those few seconds as we never can at any other time.

WHAT IS THE MILKY WAY?

Students of the stars think that the Milky Way is the boundary of our world of stars. It is a complete closed circle where the sky is crammed with stars; yet in places there are gaps where we can see through beyond into nothing. We can begin to measure the diameter of this great circle. Our own sun and his system seem to be somewhere near the centre of it, and a very remarkable thing about the sun, and therefore about us, seems to be that he is very much alone

in the world of stars. He has no near star neighbor, while most of the other stars are much more neighborly, especially throughout the whole circle of the Milky Way. We cannot tell at all whether the whole Milky Way is moving through space, and we do not know whether it is moving round on itself; but we can study and photograph it now, and long years afterwards our successors may compare our photographs with what they then see, and may be able to learn about these things.

IS IT POSSIBLE THAT THE MILKY WAY WILL TURN INTO A WORLD

Look closely at the Milky Way on a bright night, and you will see that it is made of many stars, only they seem so closely packed together that their light is all blended, looking like a thin cloud or a milky streak spread across the sky. If you use an opera-glass or a telescope, you see the separate stars more clearly, and if you take a photograph through a telescope—which is quite an easy thing to do—you find that the stars of the Milky Way are to be counted not in thousands, or even in hundreds of thousands, but actually by the million.

From any one part of the earth we can only see about half of the Milky Way, but this great streak of stars really forms a mighty circle, the different parts of which can be seen from different parts of the earth. The sun and the earth and other planets with it lie somewhere not very far from the centre of this great circle. Now, every one of these millions of stars is a sun like ours, only some are smaller than our sun, and many are far bigger. Any or all of these suns, for all we know, may have one or many planets circling round it, just as the earth moves round the sun. We cannot see these planets, for they must be too small, and without any light of their own, just as the earth is. So that if we were to allow only two or three planets to every star or sun that makes up the Milky Way, that would mean hundreds of millions of worlds, large and small, old and young.

WHAT ARE THE STREAKS OF LIGHT THAT SOMETIMES SHOOT ACROSS THE SKY?

These are called shooting stars. Of course, they are not stars, any more than a speck of dust or a coal-scuttle is a star. They are quite small things, often just like stones, though some of

them are made of iron. They look bright merely because, as they rush through the air, they get very hot. The smaller ones, no doubt, get so hot that as they pass through the air they burn all away, just as a candle does, and so they never reach the earth at all. But bigger ones actually reach the earth, sometimes making big holes where they fall. You may have seen such things in museums, and you can look upon few things more interesting if you think of their history, for in the beginning these things did not belong to the earth at all; only they were rushing through space, many parts of which contain large numbers of things like pebbles, and they got caught by the air of the earth and the earth's gravitation.

Many of these meteorites, as they are called, are believed to have once been part of the bright things called comets. Sometimes an accident seems to happen to a comet and breaks it up, and in the path where this comet used to travel round the sun there is, instead, a great shoal of meteorites. When the earth, in her path, happens to cross the path of the meteorites, many of them will be caught, especially if it be just at the time when the thickest part of the shoal is passing. So we know the times of the year and the special years when we may expect to see a large number of streaks of light in the sky at night, as seen in the picture on page 143. The best showers of shooting stars are usually seen in November, when the earth crosses the path of a shoal of meteorites called the Leonids.

WHY DOES THE SEA LOOK SOMETIMES BLUE AND SOMETIMES GREEN?

You might have added, said the Wise Man, why does it look sometimes black and sometimes grey? On a black night, when there is no light for the sea to reflect, the sea looks black. When the sky is grey, the sea reflects the light that falls upon it, and looks grey. The color we usually think of as the color of the sea is blue, because the sky is blue, or ought

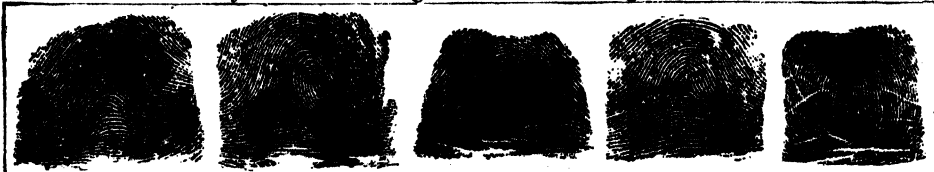
to be; and if it be blue light that falls upon it, it is blue light that the sea reflects.

Yet sometimes the sea is green, though the sky is never green. Parts of the sea are shallow, especially near the shore, and may be so shallow that some of the light from the sky may pierce the water, reach the bottom, and be reflected from it to our eyes. So, of course, the light will be changed, partly according to the color of the bottom of the sea, and partly because of the greenish tinge of sea-water itself. Besides all this, we have to remember that the same part of the sea on a coast we know well may be of a different color on different days, even though the water is the same and the color of the bottom is the same, because the sun is in a different part of the sky, and so the light strikes the bottom differently, or because the sky is clouded, and so the light which reaches the sea from the sky is different. Thus, there are many different things which will affect the color of the sea, and that is why its color changes so much and is so beautiful to see.

HOW CAN THEY CATCH BURGLARS BY THEIR FINGER-MARKS?

You have heard, perhaps, that nowadays burglars wear gloves in order to avoid leaving their finger-marks on a window-pane or anywhere else. The fact is that all men and women differ from each other in little things, and there is nothing in which they differ more certainly than the pattern of the little ridges on their fingers. Two patterns exactly the same from two different people have never yet been found. These patterns cannot change, for they are formed by the innumerable mouths of the tiny canals which convey the sweat from the deep-seated sweat-glands to the surface. They can be destroyed, of course, but no different pattern can be put in their place.

Thus, of all the ways of knowing who is who, this is the most certain, as well as much the simplest and cheapest. It is now being more and more used. If



These are the marks of men's fingers on things they have touched. Finger-prints like these help the police to catch burglars. No two finger-prints from different people have ever yet been found to be alike.

THE BOOK OF WONDER

THE SHADOW OF THE WORLD



HOW THE MOON THROWS ITS SHADOW ON THE EARTH, SHUTTING OFF THE LIGHT OF THE SUN



HOW THE MOON COMES BETWEEN EARTH AND SUN, CAUSING THE SHADOW SHOWN ABOVE



HOW THE EARTH THROWS ITS SHADOW ACROSS THE MOON

We have all seen our shadows on the ground, but there is one great shadow that not all of us have seen. That is the shadow of the whole world. On its way through space the moon passes sometimes between the sun and the earth, shutting off the sunlight from the earth, as shown in the top picture. The middle drawing shows that the moon does not hide the sunlight from the whole of the earth, but only from a part of it, and the moon's shadow makes day so dark in that part that we can see the stars. We call this an eclipse of the sun. Sometimes, too, the earth passes between the moon and the sun so as to cut off all sunlight from the moon, as shown in the bottom picture, and the shadow thrown by the earth upon the moon is about 240,000 miles long—long enough to reach thirty times across the earth. We call this an eclipse of the moon.

a man's thumb-mark is the same as the mark on a piece of paper where a theft was committed, the evidence against him is very strong. A bad man who has become known to the police may change his clothes and the appearance of his face, he may look like a different person, and have not the slightest resemblance to the photograph taken of him, but his thumb-mark will tell him at once.

WHY DO SOME FACES IN PICTURES SEEM TO FOLLOW US?

It is clever to have noticed this, and perhaps you have also noticed that in other pictures there are faces which are not looking at us; but no matter where you walk, even though it be in the direction in which they seem to be looking, you will never find the face looking at you. Indeed, faces in pictures are either looking at us, from wherever we look at them from, or else they are never looking at us, wherever we look at them from. The same is true of photographs.

The rule is very simple. If the person who was being painted or photographed were looking at the painter or at the camera, then, wherever you stand, he will seem to be looking at you. If he were looking on one side, then, wherever you stand, the effect is that he seems to be looking on that side of you. This works very queerly if you have a group of people who were all looking at the camera at the moment when they were being photographed. If you look at the photograph from one side, they all seem to turn to follow you, and then to turn back if you look at it from the other side. But if they were not looking at the camera, you can never get them to look at you.

WHY DOES THE SMOKE OF A TRAIN GO THE OTHER WAY?

When the smoke leaves the funnel of the engine it is really moving forward, like the engine itself, and at exactly the same rate. If we could imagine that the train was moving onwards in *nothing*, then, since we know that moving things always move on in a straight line at the same speed for ever, unless something outside affects them, the smoke would move forward with the train, and would actually pass on in front of it so soon as the driver slowed the train. But the smoke, we know, is really poured

into the ocean of air through which the train is pushing its way. The air tends to stop the train, as it tends to stop everything that moves through it, and every engineer knows how important this air-pressure is; but though it retards the train a good deal, it retards the light, hot smoke that is poured into it far more. The question reminds us that the smoke seems to go in the opposite direction to the train; but really it simply moves forward so



These eyes seem to follow you everywhere; they look at you in any direction. That is because they were fixed on the painter when he was at work, as explained on this page.

slowly and for such a little distance that, compared with the train, it seems to go the other way.

But if a strong wind is blowing in the same direction as the train—and perhaps this is oftenest seen in the case of the smoke from a ship's funnel—then the smoke is blown forward by the wind far in front of the train or ship. In this case and the last the same principle works, though the results are so different. The principle is that the air affects the smoke more than the train or ship. In one case it holds both back, but it holds the smoke back most; in the other case

it blows both forward, but the smoke most.

ARE ALL ANIMALS BORN BLIND?

It is not quite true that all animals are born blind, but it is quite true that most of the mammals, when they are newly born, do not at once begin to use their eyes to see. The eyes themselves are there, however, quite fully developed and all ready to be used for seeing as soon as they have become accustomed to the strong light. The young of wild animals are born in a nest or a lair selected by the mother, and this is generally placed in some dark and secluded place to which very little light gains access. There would be no object in the young opening their eyes widely to the full glare of the sun's rays before they are able to move about, because most young mammals are very helpless at birth, and have to lie still in their nests until they have grown strong enough to be able to look after themselves. By that time they have got used to a certain amount of light. They can open and shut their eyes, and when they begin to move and gradually come into light, the eyes also gradually become used to that light. So that really they are perfectly able to see at the time that they require their sight either to obtain their food or to guide their footsteps.

OF WHAT DOES THE HEN MAKE HER EGGS?

All birds lay eggs, but what we commonly call a hen's egg, with its shell, consists of a good deal more than the real egg, which is the growing part of a chicken. In fact, most of the hen's egg is made of substance secreted by a special organ in the body for the purpose of nourishing the growing chicken within. This nourishing material is what we call the yolk. It is made, of course, from the food upon which the hen feeds, which becomes changed by digestion, and is carried through the hen's body by the blood. Then, in a special part of the body, the proper elements are taken from the blood and made into the yolk, upon which the growing chick feeds. The whole thing is then covered with a shell, which is also secreted from the things upon which the hen feeds.

WHY DOES A BAD EGG FLOAT, SEEING THAT A GOOD EGG SINKS?

A fresh hen's egg consists of a mass of

yolk, together with what we call the white of the egg, and this, being heavier than water, will cause the egg to sink when it is placed in water. But in an egg which has become addled or rotten, the yolk and white have split up into other things, and produce gases which escape and the egg becomes lighter than it was before. In fact, such an egg does not weigh as much as an equal bulk of water does, so that if placed in water it will float and not sink.

WHY DOES AN OWL COME OUT ONLY AT NIGHT?

Quite a number of animals, and some other birds besides owls, are *nocturnal* in their habits—that is to say, they are adapted for living their lives generally during the hours of night. If we want to understand why an animal comes out at night, or why it comes out in the daytime, we must, as a rule, ask ourselves: What is it that makes an animal active at one time of the day rather than at another? The answer to this question is generally to be found in the search for food. So it is in the case of the owls. Owls feed chiefly upon mice and other small creatures that are active during the hours of the night, and so the owl, with its peculiar noiseless flight, due to the fact that its plumage is so soft, comes out at night in search of food. It is because of this habit that the pupils of the owl's eyes are adapted for seeing at night, being made to open very widely to catch every ray of light that there may be, and so see where other animals would be unable to see.

CAN A FISH HEAR?

Although fishes are like some other animals in having no visible signs of ears, yet they have ears which conduct sound to the brain. Their organ of hearing consists simply of an internal ear placed inside a gristly capsule. In some fishes—as, for instance, the dog-fish—there is a fold known as the *false gill*, which is no doubt the remains of a real gill, but is now used for transmitting sounds to the internal ear. In the wall of the capsule which contains the internal ear there is a thin spot, and it is through this thin part, corresponding with what we call the drum of our own ear, that the sound is conducted. Thus, we see that in the case of some of the fishes there has been a change of function of an organ which was

in the first place a gill, but has now become part of the hearing apparatus. In other words, it is a structure at one time used for breathing, but now used for hearing.

HOW IS IT THAT FISHES DO NOT DROWN ?

All animals and plants must get air in some way or other in order to live ; or, to be more strictly accurate, they must have a supply of oxygen, which is one of the gases in the air. Should this supply of oxygen fail, death must come, no matter whether it be from drowning or from any other cause. When a man is drowned, what really happens is that, on account of his being so long under the water, his supply of life-giving oxygen has run short, and as he can only get it when he is in the air, he dies.

But this is not because there is no oxygen to be had in the water, for, as a matter of fact, there is quite a large amount of this life-giving gas dissolved in water, only human beings and animals breathing by lungs cannot make use of it. Their organs are only adapted for breathing air. The fishes, on the other hand, breathe by gills, not lungs, and the wonderful way in which gills are made enables them to extract the oxygen from the water. Being able to do this, they can live under water perfectly well. But if anything should happen to prevent the fish from getting oxygen from the water, or if anything should happen to the water to deprive it of its oxygen, then the fish would be drowned, as would any other animal.

WHAT PART OF OURSELVES DO WE LOSE WHEN WE LOSE OUR BALANCE ?

You have probably imagined that we stand entirely with the help of our feet, but that is quite wrong. We are supposed to be able to balance ourselves, when standing, largely by means of some very complicated structures in connection with the ear. These are three little canals which lie in different directions, and are filled with fluid. These canals communicate by nerves with various parts of the brain. It has been suggested that if a person suddenly turns round, or spins round, the fluid in these canals partakes of the movement, and so gives us the sensation of turning round even when we stop. If this be true it would explain why we feel giddy and lose our balance even though we are no longer turning. But there are

other causes that make us feel giddy and lose our balance, some of which men have not yet been able to properly understand, and the details of which are much too difficult for us to enter upon here.

WHAT CHANGES THE WAY OF THE WIND ?

Like almost everything else, the air is always moving, more or less, and the changes in the direction of its movements are due to many different things. There is, for instance, the movement of the earth on itself, and also its changing position in regard to the sun as it goes round the sun. These movements mean that different parts of the earth are exposed to the sun at different times ; and that means, of course, that different parts of the air are exposed to the sun at different times. When the sun shines on the air it makes it warm, and warm air is lighter than cold air, and will rise, while cold air will flow in to take its place.

But there is a great deal more in it than this. Besides the fact that the surface of the earth is not smooth, but has mountains and hills that turn the wind as the earth turns, and tracts of water which cool hot air as it passes over them, there are all sorts of electrical changes always going on in the air, and these probably affect its weight—perhaps even the proportions of the various gases in it—even as much as the heat of the sun affects it. You can scarcely ask more difficult questions than these about wind, rain, and weather.

WHY DO THE TELEGRAPH LINES HUM ?

Anything that is stretched is apt to be thrown into vibration, or made to tremble, by the force of the air blowing against it. If it vibrates so fast as to produce the air-waves that our ears can hear, then that is what we call sound. This is what happens to the telegraph wires when they hum ; and if we put our hand on the telegraph pole we shall feel that the wires vibrate strongly enough to set the whole pole trembling, too. If we think of the way in which our own voices are produced we shall see that the telegraph lines hum in exactly the same way as we hum ourselves. Something stretched, in each case, is made to tremble. When the air is quite still, you will not hear the telegraph lines humming.

THE NEXT QUESTIONS BEGIN ON PAGE 2005.

The Story of THE EARTH.

WHAT THIS STORY TELLS US

WE have learned about the principal compounds, and the way they are related ; here we learn about some wonderful mixtures of metals called alloys, which are as interesting and valuable as if they were really new compounds. Then we conclude our study of chemistry by looking at a few of the principal compounds of carbon, which are found everywhere in the world of life. We learn how these compounds run in long series, so that we can foretell what they will be, and what properties they must have, even before we find them. We learn in these pages, also, about the alcohols, especially the particular alcohol that people drink, about ferments and fermentation, and about the way in which alcohol and bread are made by ferments. After this we must leave the study of chemistry for the present, and go on to the study of the stars. We shall see that they have their chemistry, too.

CHANGES ALWAYS GOING ON THE CHEMISTRY OF ALL LIFE AND LIVING THINGS

THIS is the last part of our book in which we shall have space to learn about chemistry, though in other parts of the book we shall find that chemistry turns up again and again. So here we must go on to look at some of the important compounds that are found in the world of life especially.

Hitherto we have been dealing mainly with what is called inorganic chemistry—the chemistry that does not have to do with living organisms or living creatures. But in the world of life we find a wonderful realm of chemistry, which we have really only just begun to explore, and we find that the compounds contained in it are compounds of the familiar element carbon, which is interesting in charcoal and in diamonds, and in lead pencils, but a thousand times more interesting in ourselves and in all living creatures.

We have already seen some compounds of carbon, such as carbon dioxide and calcium carbonate. These are very simple, but carbon forms hundreds of thousands of other compounds, some of them having hundreds of atoms in the molecule, and the *chemistry of the carbon compounds* is the name now given to what used to be called organic chemistry.

This new chemistry has all the same laws and principles as that about which we have learned hither-

CONTINUED FROM 1817



to. The laws of atoms and molecules, the laws of elements and compounds, and of oxidation and decomposition, and of chemical equations, and so on, are true everywhere, or they would not be worth discussing. They are true in a fire or in our bodies, true on the earth or in the sun—for Nature is a mighty whole, and is consistent in all her workings.

But just before we go on to this last division of chemistry, a word must be said regarding some very interesting and valuable chemical substances, not compounds, yet not elements, which play a great part in modern life. We know that when we make the elements combine with each other we get new substances, very different from those we started with. Now, in some cases it is sufficient merely to get certain elements to mix with each other in order to get things which differ a good deal from any of the elements contained in them.

The greatest instance we know of this is, of course, steel, which is one of the pillars of life as men live it now, and which we get by mixing, but not chemically combining, iron and carbon. And here may be mentioned a few other mixtures which have special names. There are, for instance, one or two mixtures of mercury with other elements, such as the mixture of sodium and mercury. The name for these mixtures of mer-

cury is *amalgams*, and you may have seen a word like this; for sometimes we say that when, for instance, two firms or two societies have joined together, they have *amalgamated*. But, apart from the amalgams, there is a special name for mixtures of metals which can be mixed together when they are melted and remain mixed when they turn solid. These mixtures are called *alloys*. When we want to say that a thing has been very good, with nothing to say against it, we say that it was "without alloy," or "unalloyed." Thus we speak of "unalloyed pleasure." When we say this, we are really comparing the thing to *pure* gold, which has not been alloyed with any "base" metal, such as copper. For our gold coins we use an alloy of nine parts of gold to one of copper, because the copper makes the gold harder. And, similarly, we use the same proportion of copper for silver coins. When we say a ring or an ornament is 14 or 18 carat gold, we show the proportion between the gold and its alloy. Twenty-four carats make an ounce, and 18 carat gold is gold eighteen-twenty-fourths pure.

THE MIXTURES OF METALS CALLED ALLOYS, AND THEIR GREAT USEFULNESS

Much the most generally useful alloy is brass—an alloy of copper and zinc. Common brass has about 70 per cent. of copper and 30 per cent. of zinc. An alloy of the three metals zinc, copper, and nickel is called "German silver." There is no silver in it. Tin and lead alloy to form "solder," and when the proportion of lead is a good deal higher, they alloy to form "pewter." Tin and copper alloy to form "bronze"—a fine substance for casting statues in—and the words on this page are printed with an alloy of lead and antimony, which is called "type-metal."

No one can yet explain why alloys should differ in many of their properties so markedly from the metals that make them; and we find in some cases that even the tiniest proportion of some new metal added to an alloy will increase its strength, for instance, enormously. Especially does this apply to steel. Metals, such as chromium and manganese, alloyed with iron, when it is made into steel with carbon, add to its usefulness so much that the older kinds of steel are now made only for the commonest

purposes. This branch of study has scarcely been more than begun as yet, but it is plain that we shall learn how, by means of suitable alloys, to get materials which will do almost anything we require of them, not only in the case of steel, but in many others. For instance, we may find an alloy which has the strength of steel but only a fraction of the weight of steel, and so may solve one of the great difficulties in the way of making flying machines.

THE SPECIAL INTEREST OF THE CHEMISTRY OF THE CARBON COMPOUNDS

Now we must pass from these very curious mixtures of elements, in which their proportions may be varied indefinitely, to look at the chemistry of the carbon compounds; and here we find the strictest regularity in the way in which these compounds are made. Quite apart from their enormous importance in the world of life, it is this regularity of composition that makes them so interesting to the chemist. They seem all to be built on certain simple models; and from each of these models we find long series of compounds formed. For instance, there is a compound called marsh-gas, which has the formula CH_4 . Then we find, derived from it, a long series of compounds of which each has one atom of carbon and two atoms of hydrogen more than the one before in the list. Thus, after CH_4 , we have C_2H_6 , C_3H_8 , C_4H_{10} , C_5H_{12} , and so on. In this part of chemistry there are dozens of series like this, where the molecules seem to be built up of little groups of atoms twice, thrice, and so on repeated. And a specially interesting thing is that all the properties of these compounds vary in a regular way, according to their construction. As we pass along such a series, we find, for instance, that each member of it boils at a higher temperature than the last.

THE MAKING OF CHLOROFORM, WHICH HAS SAVED MILLIONS OF PEOPLE FROM PAIN

Marsh-gas, CH_4 , is called a hydrocarbon, because it contains hydrogen and carbon. We know any number of these hydrocarbons which occur in Nature, and we can make many more. Also we can make new compounds from them by exchanging certain of their atoms for other atoms. A celebrated instance of this was the making of chloroform. We can take marsh-gas,

CH_4 , and can substitute an atom of chlorine, Cl , for one of the hydrogen atoms, or two for two, three for three, or four for four. Thus we get compounds CH_3Cl , CH_2Cl_2 , CHCl_3 , and CCl_4 . The third of these, CHCl_3 , is chloroform, which has saved millions of people from the most awful pain that can be inflicted on human beings. When chloroform was first made by Liebig, three-quarters of a century ago, he was only studying the hydro-carbons.

HOW ONE MAN'S STUDY OF A DRY SUBJECT PROVED A BLESSING TO MANKIND

Many people would say this was a dry subject, and perhaps you think it is not worth while to know anything about it. Yet it is always worth while to study every part of Nature, and to use all the powers she confers on those who study her faithfully. Liebig was satisfied if, as a result of his work, he proved that three atoms of hydrogen in the molecule of marsh-gas could be replaced by three atoms of chlorine. That was a chemical *fact*, and all facts are precious. He could not guess that this new compound would prove to be one of the most priceless things in the world.

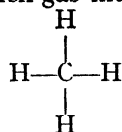
This is a great lesson for those who say that science should only study what is useful. No one knows what will or will not be useful; and the more we learn, the surer we are that all facts, every truth of every kind, will be useful some day. The chemist's work with the hydro-carbons, starting with marsh-gas, and with other carbon compounds related to it, has given mankind some of the most valuable things it possesses, and will yet give us many more.

HOW CH_4 AFFECTS EVERY MAN WHO GOES DOWN INTO THE EARTH FOR COAL

Here we need only study marsh-gas, and may leave the other hydro-carbons out of account. Marsh-gas comes out of marshy ground, and can quite easily be collected in jars by stirring up the mud at the bottom of stagnant pools. It is also found in coal-gas, and is one of the gases which are formed from coal in coal-mines even before it is burned. Miners call it "fire damp," and when it mixes with the air of a mine, a match will explode it. Many miners have lost their lives in this way; but now they use the safety-lamp invented by Sir Humphry Davy, in which the light is

enclosed, or else the mines are lighted by electricity.

Chemists do not go to marshes or coal-mines when they want marsh-gas, for they can make it for themselves quite easily from various compounds. It cannot be made directly, for carbon will not directly combine with hydrogen. It is a gas without color or odor—unfortunately for coal-miners—and when it is burned it forms carbon dioxide, CO_2 , and water, H_2O . We have already learned how it is possible sometimes to write the formula of a compound in a graphic way, and if we remember what was said there about the number of "hands" that the carbon atom has, and the number that the hydrogen atom has, we shall see that the graphic formula of marsh-gas must be



From the hydro-carbons we get a large number of series of other compounds. For instance, we can make one of the hydrogen atoms be replaced by the group of atoms $-\text{OH}$, which we called hydroxyl. If we do this to marsh-gas, we get a substance with the formula CH_3OH . If we do it to the next hydro-carbon, C_2H_6 , we get a substance $\text{C}_2\text{H}_5\text{OH}$, and so on through the whole series.

THE TERRIBLE POISON ALCOHOL, WHICH INJURES ALL LIFE THAT IT TOUCHES

Thus we get a new series of substances which are exceedingly important chemically, and in many other ways. They are called alcohols. The second alcohol, $\text{C}_2\text{H}_5\text{OH}$, is the liquid we usually call alcohol—as if there were no others—and it is at least as important in its effect on human life as any compound known to chemistry. All the alcohols are poisonous. The first, CH_3OH , is called *methyl-alcohol*, and as it is very disagreeable, it is added to ordinary alcohol, so that this may be used for burning, and for many other purposes, without people drinking it. The mixture is called methylated spirits, and everyone knows it well. The second alcohol is *the* alcohol. This is more poisonous than the first, and has been proved to injure the life of every form of living creature, animal or plant, that has been

exposed to it. Further on in the series of alcohols they become still more poisonous than either methyl-alcohol or ordinary alcohol, of which the real name is ethyl-alcohol. One of these other alcohols is very apt to occur in whisky; in fact, it always occurs in raw whisky.

WHY ALCOHOL IS ONE OF THE GREATEST CURSES IN THE WORLD

And, as almost anyone may sell raw whisky if he finds people foolish enough to buy it, we can often see the effects of this alcohol upon human beings. When whisky is kept for some time, this alcohol, which is often known as fusel oil, disappears, and so matured whisky is less quickly and seriously poisonous than raw whisky. But the best whisky, or "spirits" of any kind, contains a large quantity of ethyl-alcohol, which has a particular effect on the brain that makes people like it. Ethyl-alcohol, in this and other forms, is the principal curse of our civilisation to-day, and as people are allowed to sell raw whisky to the primitive people we call "savages," who are very easily hurt by it, it is now the principal curse of them as well. We call *them* savages, but which of the two are really savages is another question. Alcohol is a very valuable liquid in some ways, as for cleaning purposes and for burning. It will probably soon be more valuable still, for very likely we shall learn to use it for running all kinds of machinery, when the world's supply of gasoline comes to an end.

HOW THE SUGAR IN THE JAM MAY TURN TO ALCOHOL

Among the series of carbon compounds we find a large number which contain carbon combined with hydrogen and oxygen in the proportions in which they occur in water; for instance, $C_6H_{10}O_5$, $C_{12}H_{22}O_{11}$, and so on. All these are called *carbo-hydrates*. We must try not to be confused between the two words hydro-carbons and carbo-hydrates. Before we learn anything more about the carbo-hydrates (which you and I are very fond of, for sugar is a carbo-hydrate), I want to tell you that they, or some of them, are the sources of alcohol. This has been known to mankind for at least ten thousand years, as has been proved by recent study of the remote past in Egypt.

As a matter of fact, we have all noticed for ourselves that alcohol is formed from sugar. We have all tasted jam that had turned to have a curious taste which we probably did not much like. The sugar in the jam had begun to turn into alcohol—the jam had begun to ferment.

When sugar is decomposed by what we call fermentation, it always produces two things—alcohol and carbon dioxide. Bread is made to rise in this way. The dough contains a lot of starch, which is a carbo-hydrate, and that is changed into another carbo-hydrate, really very much the same chemically, which is sugar. The yeast is the ferment which acts on the sugar, producing alcohol and carbon dioxide. The alcohol evaporates and the carbon dioxide forms in little bubbles, which raise the dough and make the bread. In "aerated bread" no yeast is used, but carbon dioxide is forced into the bread from outside.

THE WAY IN WHICH SUGAR AND STARCH AND POTATOES ARE MADE INTO ALCOHOL

This fermentation of sugar to form alcohol and carbon dioxide is always occurring. When the sugar is in grapes the result is wine. Grapes are the fruit of the vine, and we should really pronounce vine as if the *v* were *w*; the two words are the same. But alcohol can be made and is made from many things which do not contain sugar, so long as they contain starch; and as most plants contain starch, which is a sort of reserve food supply for them, it is easy to make alcohol. Barley is largely used for this purpose, and while some countries pay other countries for their wheat or else they would die of starvation, large areas, where wheat might be growing, are now growing barley to turn into whisky—which also has to be paid for in several ways by women and children and babies as well as those who drink it. Also potatoes are mostly starch, and so alcohol can readily be got from potatoes. Several of the native races of Africa are now being rapidly wiped out by potato spirit sent to them from European countries.

But for the chemist the most interesting thing is the way in which the fermentation of starch and sugar into alcohol is brought about. We must find out what yeast is, and how it does its work. Of course, the power of yeast

had been known for a long time, but it was less than a century ago that the astonishing discovery was made that yeast is a living creature.

HOW YEAST LIVES AND WORKS AND DIES IN MAKING ALCOHOL

Yeast, we now know, is a minute plant, and its natural food is sugar. In feeding on this sugar it turns it into alcohol and carbon dioxide. If the alcohol is allowed to get stronger and stronger, the yeast plant dies, just as any living creature dies if it is surrounded with the waste products of its own life; and therefore, in preparing alcoholic liquors, it is often necessary to remove the alcohol as it is formed, or the fermentation will stop, as the alcohol kills the plant that makes it, as it will kill any living creature if taken in large enough doses.

We have since learned that the yeast plant ferments alcohol by a special substance, a ferment, which it produces within its living cells; this substance can be separated, and even then will ferment sugar. We have also learned that all the processes of living creatures are carried on by means of ferments, and the chemistry of fermentation promises to be the most important part of the chemistry of the future, as it will deal with the chemical processes upon which life itself depends.

The great fact about a ferment is that it sets going chemical changes without being changed itself. Thus there is no limit to the amount of work that even a tiny quantity of a ferment can do. In other chemical changes the thing that starts the change is used up. We can make only a fixed quantity of salt out of hydrochloric acid and soda, and they are used up in the process; but a ferment acts on the substances round it without being acted upon itself. Here we have only mentioned alcoholic fermentation, which is the one that has been longest known, and is much the most important we know yet; but this is only one example out of hundreds.

THE SUBSTANCES CALLED ETHERS AND ALDEHYDES, AND THE WORK THEY DO

Closely related to the alcohols there is a long series of substances called *ethers*. One of them—the one that corresponds to ethyl-alcohol—is very

valuable, like chloroform, because people who breathe it cannot feel pain.

Then there is another series called *aldehydes*, and this is equally long and closely related to the others. Aldehyde is a short way of saying alcohol-dehydrogen, and it tells us that the aldehydes are alcohols which have lost some of their hydrogen.

The first aldehyde is very useful, and is usually known as *formalin*, and is very deadly to microbes, and is largely used to preserve things; but it is a poison, and its use to preserve food is very wrong, and has been forbidden.

Another aldehyde, called paraldehyde, is one of the very best of all the medicines used to make people sleep when they are ill.

The formula of formalin is CH_2O , and this is very interesting. We know that plants make the carbo-hydrates, such as starch and sugar. We know that these carbo-hydrates have in them carbon, and hydrogen and oxygen in the same proportions as in water. We know, too, that plants get the carbon from the carbon dioxide of the air by their leaves, and the water from the soil by their roots. Now, the simplest combination of water and carbon that we can imagine is CH_2O , and we only need to multiply that, say, by six, to get sugar, $\text{C}_6\text{H}_{12}\text{O}_6$. So botanists expect soon to prove that the first thing the plant forms—just for a moment—in making sugar from water and carbon is formalin, CH_2O .

THE END OF OUR BRIEF STUDY OF CHEMISTRY

Many books have been devoted solely to the hydro-carbons, the alcohols, the aldehydes, and the acids which correspond to and are made from them. We know that alcoholic drinks often turn sour, and the cause is that the alcohol has turned into vinegar, or acetic acid. Here we cannot go farther. Only we must conclude this brief account of chemistry by saying that another department of it, of no less importance, deals with the compound called benzene, C_6H_6 , and with the thousands of compounds—many of them very valuable, such as carbolic acid—which are derived from it. But don't mix up carbonic acid and carbolic acid, as I used to do at school!

THE NEXT STORY OF THE EARTH BEGINS ON 1959.

THE KING OF THE HUNTING BIRDS



The king of the hunting birds is the eagle, and the most splendid of the order is the golden eagle. In the few places in America where it still makes its home, it nests in solitary grandeur far up the mountain-side. There it carries birds and animals to its young ones, and watches over them with the tenderest care.



The bald eagle eats fish as well as animals and often robs birds less powerful than itself. It can drag a salmon from the water as easily as it can catch a hare.



The osprey is the great fishing hawk. It catches its prey in the sea and in the rivers and lakes. If not disturbed, it builds year after year in the same place.

The Book of NATURE



NATURE'S WINGED HUNTSMEN

THE air has its lions and tigers—not real lions and tigers, but birds which, in their way, are as fierce and hungry as the great four-footed animals of the jungle and the plain. When we study their lives, we can see that the eagles, the falcons, the kites, the buzzards, the vultures, the owls, and other flesh-eating birds, play a similar part to that played by the flesh-eating animals. Some strike down their prey, kill and eat it; others wait until the death of an animal or a man has taken place before they begin their meal.

First in the scale of splendor among the hunting birds comes the eagle, the most noble-looking of birds that fly. It is the king of the falcon family, which includes no fewer than 300 species of birds that hunt their prey by day. Here for the moment we will keep to the eagles proper, and glance at some of the most important.

The largest are the sea-eagles. Of these there are several species, scattered over a great part of the world. They live in the northern parts of Europe and Asia, and in Greenland. They are still found in Scotland and the northern islands, and in wild parts of Ireland. Occasionally one may stray into England. One was caught in Windsor Forest in 1856, measuring eight feet across the wings and three feet two inches from the point of the beak to the tip of the tail,

CONTINUED FROM 1829



and weighing twenty-two pounds.

Generally speaking, however, in the British Isles we must go to the deer forests and to the bare, barren hills still farther north of Scotland to find eagles. There the sea-eagles may

be seen in their glory; and the splendid golden eagle is, though not frequently met, still seen with sufficient frequency to remind us of the days when Scotland was more generally the home of wild animals and birds once common in these islands.

The sea-eagle is so called not because it swims in the sea, but because, in addition to eating birds and animals as food, it likes fish, and, pouncing down into the sea, river, or lake, it draws forth from the water whatever may have attracted its attention. The American bald eagle is a kind of sea-eagle.

Once a sea-eagle was seen to drop from the air swiftly into the water and plunge its talons into a fine salmon. The salmon struggled violently and dragged the great bird under the water. The eagle could not release its talons, and the salmon would not cease struggling and swimming, and so keen were both on their battle that a man was able to steal up and secure both bird and salmon. The sea-eagle varies his diet of fish with meals of game birds, hares, rabbits, young lambs and kids.

The largest and handsomest eagle of either Europe or America is the golden, which our Indians named war-eagle, because they made their war-bonnets of its feathers. It has almost disappeared from the eastern half of the United States, mainly because wasteful men have shot every one they saw. Those that remain are to be found in the wilder parts of our mountains, or in the Far West, or in Canada. In Europe, also, they are rare, except in out-of-the-way districts.

WHERE THE GOLDEN EAGLE BUILDS ITS NEST AND MAKES ITS LARDER

Like most other birds of prey, the female golden eagle is larger than the male. Her length, from the tip of beak to the end of tail, is about a yard; while the male eagle is three inches less. The plumage of these birds is rich and handsome. While the colors may differ, the majority of these birds have feathers of a golden-brown hue. The golden color occurs near the tips of the feathers, and gives a golden appearance to the whole. The bird builds in high, rocky places far from the haunts of men, and the rough, strong nest cannot be reached except by a rope let down from above.

Eagles are watchful parents. They will fiercely attack anyone who attempts to approach the nest in which their young ones are. The little eagles have big appetites, and the parent birds have to maintain quite a larder for them. The larder is generally a large rock near the nest, so that the eaglets can go to it and feed while the parent birds are away. Here on this stone hares and rabbits and birds are placed, and these the eaglets eat at their leisure.

If the little eagles need so much food, what do the big eagles require? They have hearty appetites to support their weight and flying powers.

THE STORY THAT THE EAGLE CARRIES OFF CHILDREN IS NOT TRUE

A golden eagle will eat in the course of a day a couple of partridges or ptarmigan or a hare. It can live on that, but, like other creatures, it prefers variety in its food. These eagles will sometimes willingly eat putrid flesh as a change from their ordinary diet; and men, knowing this, set traps and catch them as if they were the silliest birds. But the desire for change does not end

here. The eagles carry off lambs to their nests, and they attack and kill deer. It has been told a thousand times that eagles carry off children; but though we know for a fact that they will *attack* children guarding flocks which the eagles desire to rob, there is no proof that children ever have been carried away by these birds.

As to their attacking deer, there is no such doubt. They set about their work with as much method and skill as if it were part of their everyday life. Generally they will attack a young deer, that being more easy to kill. They drop from the sky like a flash upon the back of the deer they mean to have. If they can, they drive it from its mother. The faithful hind, if she can keep her little one close beside her, will fight the great eagle with splendid courage, and, striking out with her front feet, may beat it off. But if the fawn can be driven away from the hind, the hind becomes so alarmed that she seems unable to act, and in that case the eagle will send the little deer racing away in terror and kill it with its terrible talons and beak.

HOW THE EAGLE WILL TERRIFY A HERD OF DEER TO CATCH ITS PREY

If this plan cannot be tried, the eagle does a still more amazing thing.

It will hover over a herd and frighten them into running away. Just as they are bounding round some narrow path which winds round the top of a precipice, the bird will swoop down upon the back of the deer, and drive home its great claws. The deer in terror seeks to throw off its foe, and generally jumps down the precipice, so killing itself and affording the eagle a meal without further trouble. That is just what the eagle wants, and it is for that reason that it makes its attack when the deer are in so perilous a place.

The only chance for a young deer when so attacked is to bolt into a narrow division between the rocks. There the eagle is practically powerless, for, seeing that its wings, when outspread, measure from eight feet to ten feet across, of course it cannot fly in a little space, and it will not venture in on foot. Eagles have been seen to suffer defeat in this way in Scottish deer forests. But they do not, as a rule, lose their prey.

THE GREAT FAMILY OF VULTURES



The strangest-looking vulture of the family is the king vulture, whose extraordinary bare neck is brilliantly tinted with orange, purple, and crimson.



Griffin vultures are found in Europe as well as in the East. They build on high rocks, but sometimes steal the nests which eagles have made and left.



The Egyptian vulture was the chief scavenger of the land of Pharaoh. The Egyptians valued it, and carved its likeness on their monuments and tombs.



The condor is the largest of the vultures, and, indeed, of all birds of prey. It makes its nest in mountains, and flies as gracefully as a winged yacht.



The lammergeier is known as the bearded vulture. It descends from its mountain home to eat dead animals, and carries smaller ones to its nestlings.



The secretary vulture kills and eats snakes in South Africa. Its feathered head makes it look like a clerk, with a quill pen in his ear; hence its name.

Sir Charles Mordaunt saw a remarkable sight in the forest of Glen Feshie, showing how the eagle can hunt. While he was stalking a herd of deer, he saw through his telescope that the animals became suddenly alarmed. He knew he had not caused their fright, for he was too far away. Suddenly a great eagle swooped into sight and attacked one of the small stags. Its plan was to drive it away from the rest of the herd, so that they could not help it. The bird did not attack with beak or talons, but kept striking the stag heavy blows on the back with the middle joint of his powerful wings. Several times it seemed as if he would fail to get the stag away, for the bird kept rising into the air as if to fly away. But each time he returned with more determination, and at last he did get the stag away from the rest of the herd and killed it. The man who had gone out to kill a deer by the aid of a gun saw his victim taken before his eyes by one of the hunters of the air.

HOW AN EAGLE ESCAPED FROM WESTMINSTER AND WAS TEMPTED HOME

When he cannot get game or deer the eagle will eat many other things. Frank Buckland, of whom we have already read in these stories, kept a sea-eagle at Oxford, and, hearing a great squealing in the middle of the night, went out and found that the bird was eating a hedgehog, bones, prickles and all. Another day it tried to eat a dog, and after that nearly made a meal of Buckland's pet monkey. Several cats and guinea-pigs and a tame jackdaw were not fortunate enough to escape the clutches of this hungry bird.

When Buckland left the University he brought his eagle to London and kept it at the house of his father, the Dean of Westminster. One day it managed to escape. By fluttering and clawing its way up a wall, it got on the wing. At first it was very unsteady, but when at last it got clear of the houses, away it sailed in splendor. Its old strength came back to it, and the eyes of all London were turned towards the sky where the noble bird was soaring. All day it was absent, and anybody but Buckland would have given up hope of ever seeing it again. But he knew how wonderful is the sight of the eagle. He tied a chicken to a stick in the

courtyard from which the eagle had escaped. Just before dark he heard the beating of huge wings, and to his joy saw his eagle descending from the clouds. Flying high above London, it had seen the chicken and dropped like a flash to secure it in the yard which had been its home. While the eagle was engaged in eating the chicken, Buckland popped a cloth over its head and captured it. Afterwards he presented it to the Zoo, where possibly it remains to this day, for eagles live for from one hundred to two hundred years. They are the longest-lived of all the birds.

AN EAGLE'S GAME OF DROPPING AND CATCHING IN THE CLOUDS

The sight of the eagle, so keen and powerful, is the gift of Nature; but its ability to catch things, though inherited, is developed by practice. An eagle has been seen to snatch up a wounded grouse as it fell through the air after being shot. Another swooped down and caught a hare which was being chased by hounds. The young eagle practises to enable it to do things of this sort.

One of these birds was seen to catch a mountain hare in Scotland. Away it went with the hare, up into the sky. Then, when far up, it let the hare drop from its talons. While the hare was dropping through the air, the eagle descended upon it, and caught it. Then it carried it up again, and once more let it drop, and again caught it. This it repeated several times, never once failing to catch the hare as it was falling through the air. The young eagle was at play, but it was practising for the serious business of life. Very wonderful it is that a bird should be able to give a heavy thing like a hare a good start in a fall through the air towards the earth, then catch it up and secure it.

THE WONDERFUL LOVE OF A FREE EAGLE FOR ITS TRAPPED COMRADE

Fierce as the eagle is, it is affectionate to its kind. A strange example of this was afforded in a Scottish forest, where a beautiful golden eagle was found dead in a trap which had been set to catch a fox. The bird had espied the bait afar off, and, going down to get it, had been seized by the trap and left to die a miserable death. The strange thing was that the eagle had not died of starvation, nor from any serious injury.

It was caught only by one claw. Apparently the knowledge that it was a prisoner had killed it, for there was abundant food beside it. Other eagles, seeing the prisoner in the trap, had brought it food. There, beside the dead eagle, were two grouse, and a hare, still warm when the hunters came to the trap.

THE OSPREY THAT CATCHES FISHES, AND ITS FOE THE BALD-HEADED EAGLE

Another fine hunter of both continents is the osprey, as they call it in Europe, or fish-hawk, as it is known in America. It is a handsome bird, living entirely on fish, which it catches with great skill by dashing into the sea, or lake, or broad river near which it resides. Where it is protected it not only becomes numerous, but so tame as to nest upon platforms mounted on poles, making a nest which is repaired and added to year after year, until it becomes as big as a cart-load. It is made of sticks, and amid the rough rustic work of it outside, blackbirds, wrens, and other birds often build their little cradles, and lay and hatch their eggs, unharmed by the fish-hawk, just as grateful tenants cluster about the castle of a generous lord.

In Scotland the osprey has an enemy in the sea-eagle, which will occasionally rob it of the fish it has caught. In North America the bird the osprey most dreads is the great white-headed eagle, the bird which, because of its white crown, we Americans call the bald-headed eagle. This is a bird which will eat pretty nearly anything. Though fond of fish, it is no fisherman, so it robs the osprey as it is returning to its nest with a fish in its talons.

It is impossible to be fond of a vulture, valuable as its work often is when it plays the scavenger. It is impossible not to think of the vultures on the battlefield, where dead and dying men are lying. Nor can we forget that it is the hideous vulture which the weary wayfarer, lost and dying in the great desert, has to fear.

THE VULTURE THAT DROPS A TORTOISE FROM A HEIGHT TO SPLIT ITS SHELL

There are two kinds of vultures that are less horrid than the others. The splendid lammergeier, or lammergeyer, which soars above the Italian Alps, the Caucasus, and the hills of Spain, is not so repulsive a creature as the

ordinary vulture. The average vulture has dirty, dusky-looking plumage, and its neck is bare, with the discolored flesh showing plainly. The lammergeier is feathered to the beak, and sails with the grace of a yacht in the air.

Stories are told of its attacking children, but they have not been proved. Its claws are not strong enough to enable it to carry off a child, and it attacks only what it can eat. Sometimes it will take a live animal, but, generally speaking, its food consists of the flesh of animals which have died. In India, where it is very abundant, it haunts slaughter-houses and the soldiers' quarters, on the look-out for scraps, and particularly for bones. These it carries to a height, then drops them on the rocks to split them. It does the same thing with tortoises.

The biggest of all the vultures is the condor, the huge, heavy bird which makes its home thousands of feet high in the Andes of Peru and Chile. The male bird is about four feet in length, and its wing-spread is from eight to eleven feet or more. The male bird has a large, fleshy wattle, which forms a crest to the head.

THE MIGHTY CONDOR THAT SEEMS TO BE ASLEEP ABOVE THE MOUNTAIN-TOPS

Both male and female have powerful beaks, but their claws, while they help in tearing their food, have not power enough to enable them to carry away heavy bodies. Their food consists chiefly of animals of the mountain-side and the plain, which have either died a natural death or been killed by wild animals.

The condor has marvelous eyesight, and, though it sails high up in the air so smoothly that men have believed it to be asleep while thus flying, hunters say that it is closely watching some animal on the plain thousands of feet below, which is being killed or is near death from disease. Suddenly the bird drops like a stone through the air. Others from all quarters follow; and hunters see a carcass swarming with birds which a moment before had been specks in the sky.

The condor has this trait in common with the other vultures—it can fast for several days, but to make up for this it gorges itself when it gets the chance. This accounts for the fact that cattlemen are able to catch it with ropes. It seems

unlikely that they should lasso a grand flier like the condor, but the bird so fills itself with food that it cannot rise into the air swiftly enough to avoid the noose which the expert cattleman throws.

THE POWERFUL WEAPONS WITH WHICH THE WINGED SCAVENGERS ARE ARMED

But the true vultures are greedier than even the condor. One, an Egyptian vulture, has been seen to gorge itself to such an extent that it could not move, but lay on its side and still fed. There are many kinds of vultures, some more horrid than others, but none nice. They share with the hyenas and jackals and wild dogs the filth of the villages of the East. They eat also all the putrid flesh of dead animals, and kill lambs, and kids that are too feeble to defend themselves.

They have powerful feet and claws, but not such as would enable them to carry off heavy burdens. Their beaks are the great weapons of attack. With these the larger ones can tear off the skin of a horse or buffalo, and tear the flesh from the bones, so that nothing but the skeleton remains. We have no such vultures as these in North America, but we have a good imitation of one in the turkey buzzard of the Southern States and Central America, which is neither a turkey nor a buzzard, but a small cousin of the vultures. It is black all over, except its naked red head; and is always on the look out for carrion. Therefore the people in some southern towns encourage it to flock about their markets and back streets, knowing that it will dispose of much refuse that it would be unhealthful to allow to remain.

PHARAOH'S CHICKENS, AND THE VULTURE THAT EATS REPTILES

The king vulture's naked neck is colored with shades of orange, purple, and crimson, and it has extraordinary colored fleshy wattles all round its nostrils and the root of its cruel-looking beak. All the vultures have this fact in their favor, that they are very good parents. Long ago the Egyptians so highly regarded the vulture, which in Egypt has the name of Pharaoh's chickens, that they frequently included it in their drawings and carvings as the emblem of the love of parents for their children. In some parts of the East the vulture is protected by law because of its value as a scavenger.

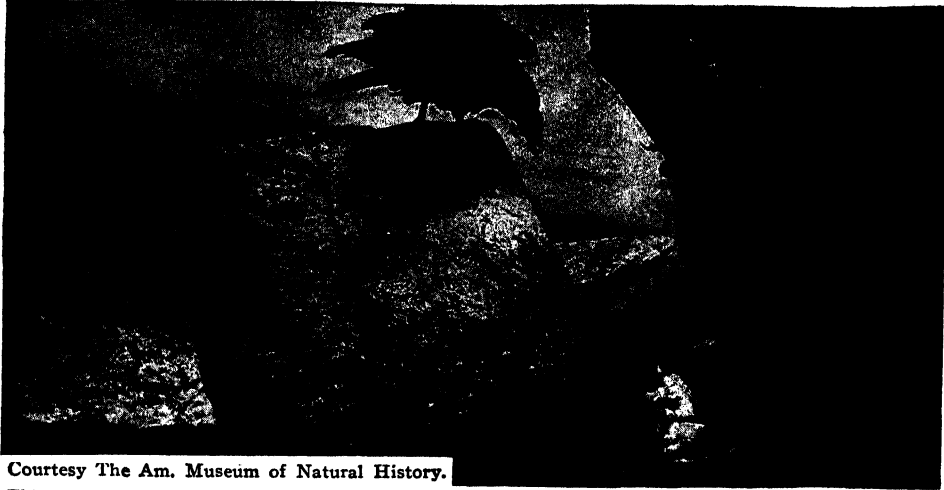
Before passing from the vulture family we must say a good word for the secretary bird, which is really a vulture. It is a curious, long-legged, long-tailed bird, with a strong, hooked beak and strong legs armed with stout scales, and claws admirably adapted to the purpose which they have to serve. Its food consists of reptiles, and among these is included a great number of venomous serpents. The bird has no fear of them. Some have been seen to avoid big snakes, but possibly that was because the birds had already been well fed. Generally it dashes at the snake, and, with its wings spread out towards the front to keep the serpent from biting it, beats it, pecks it, and stamps on it until the snake is killed. Small snakes it swallows whole; larger ones it tears to pieces. This bird is found chiefly in South Africa, where it is so highly valued as the foe of snakes that a fine is imposed for killing it. It gets the name of secretary bird from the feathers which grow out from the back of its head, looking very much like quill pens behind the ear of a clerk.

SOME OF THE SMALLER MEMBERS OF THE FAMILY OF BIRD HUNTERS

Of course, there are smaller birds in this great family of hunters than those we have so far considered. The buzzards, kites, and falcons, though having much the same nature as their larger relatives, are built on a smaller scale. The buzzard measures from twenty to twenty-two inches in length, and it has the strong beak and sharp claws of its family. But it is not so active a bird as the rest. At times it flies gloriously high up, in great circles, with very few movements of the wings which the eye can detect. As a rule, however, it prefers to get its living easily, by watching and waiting, and pouncing at the right moment upon its victim, whether that victim be rat, mouse, reptile, or bird. Parts of its plumage are very downy, so that the bird can drop down upon its astonished victim without making a sound. The buzzard is not known in this country, but is common in the old world. It has been practically killed off in England.

Kites are known in all parts of the world. Two species are common in this country, and one of them—the

SOME BIRDS THAT HUNT FOR BEASTS



Courtesy The Am. Museum of Natural History.

This is a turkey buzzard which has just come home to its nest in a crevice in the rocks with food for its hungry children. The turkey buzzard is neither a turkey nor a buzzard, but a cousin of the vultures.



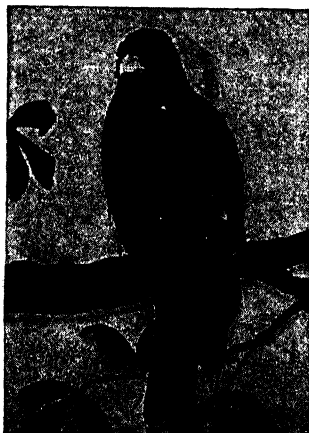
The smallest falcon is the merlin, a fierce foe, but easy to tame and make a friend of. This is the bird which the lark flies so high to avoid.



Men take the peregrine falcon to hunt, with a hood over its head. As the game appears, the hood is taken off, and the falcon sees its prey and flies after it.



The strong, fast-flying sparrowhawk hunts blackbirds, thrushes, partridges, rabbits, and hares.



The kite has a forked tail, and looks, in flying, like a big swallow. Kites were once people's scavengers.



The goshawk catches its prey by its very swift flight, clutches it, and drops to the ground with it.

swallow-tailed hawk—is so strong that it is said it sometimes flies as far as Great Britain. In the East the kite is valued as a scavenger, just as it was in Europe in olden days. It cannot be mistaken when it is seen, for the black and brown and reddish plumage of the bird and its long, forked, swallow-like tail make it easily recognizable.

THE EVIL WORK OF THE KITE AND THE GOOD WORK THAT HE DOES

The kite robs rabbit warrens, and likes game birds; but the harm that it does in this way must be more than made up by the good it works in destroying rats and mice, and snakes and moles.

Next we come to the true falcons—handsome, noble-looking birds, of which the most famous are the jerfalcon, the peregrine, the lanner, the saker, the Barbary falcon, the Indian shaheen, the hobby, and the merlin—all long-winged, dark-eyed birds, which rise high in the air, then descend like thunderbolts upon their prey and bear it to the ground; then the strong, swift goshawk and sparrow-hawk, birds with shorter wings and yellow eyes. These are the names given by falconers to European hawks, but much the same exist in North America.

These birds play the same part in bird life that the cheetah plays in the animal world. Like the powerful cheetah, they are by nature wild and fierce, but they are trained to hunt for men.

HOW THE FALCON BIRDS ARE TAUGHT TO CATCH OTHER BIRDS FOR MEN

Soft leather straps are fastened to their legs so that they cannot fly away at will. A hood is put over the head, leaving the beak and nostrils free for breathing, but preventing the bird from seeing. When the hood is removed, the bird is shown a piece of meat, and has to hop from its perch on to the wrist of the man who holds the food. He has a glove on, so that the sharp talons of the bird will not hurt him. When the bird gets used to this sort of treatment, it knows that by jumping to the wrist it will be fed. Then the distance is increased. With a light line tied to its leg, it is made to fly twenty or thirty yards for its food. Then in time the line is removed from the leg, and the bird flies free. After a while,

instead of its usual food, it is made to fly to a bird or a small animal, and catches this and returns to the wrist of its master. In this way the bird is gradually taught to hunt, and to return each time to its owner, who then gives it a good meal. It is always hungry when it starts; then, when it is a master of its work, it is carried on a perch with the hood over its head to a place where there are birds or game. The hood is slipped off, the bird sees the game, and brings it back to its master.

Like all other falcons, the peregrine is a magnificent hunter. It is supposed to be able to fly at the rate of one hundred and fifty miles an hour, yet it flies with such delicacy of direction that it can follow a smaller bird through mazes of branches and undergrowth, and take a bird off a bough without stopping or touching any part of the tree.

HOW STUPID FARMERS SHOOT THEIR BIRD FRIENDS

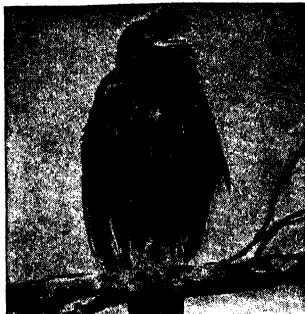
The merlin is another beautiful flier, but its length is only from ten to thirteen inches. There would never be a plague of birds to destroy the fruit of a neighborhood if a few of these dashing little hawks were allowed to live about. Perhaps the kestrel might be still more useful. This fine little hawk kills and eats great numbers of mice. It eats beetles, and caterpillars, and grubs, and is a really excellent friend of the farmer. Wise men have watched its habits, and examined the contents of its stomach, and so know its real value, yet stupid farmers still shoot it.

The harriers, another type of falcon, also dispose of many rats and mice and other enemies of the farmer, but as these things take birds which we want it is not surprising that the farmer, always ready to shoot, has no mercy for them. Most of the hawks are very brave birds; their numbers are few, and if they were not brave the other birds would kill them.

Perhaps the bravest of all are the caracaras of South America, which collect together to fight the eagle or vulture that dares to come in their way.

We have a sort of vulture in this country, though it is not a member of the eagle family. Ours is the raven, the great black bird with the huge, powerful beak, which makes its nest in

THE CROW FAMILY AND THE OWLS



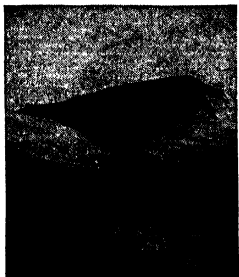
Caracaras hunt together and attack eagles or vultures which meet them.



The raven is valuable as an insect-eater, but cruel, and kills lambs.



The kestrel is a beautiful little hawk. It can be tamed and trained.



Carrion-crows eat dead animals and rob other birds.



Rooks can be distinguished from crows by their rookery. Crows nest in solitude; rooks build hundreds of nests together. Here we see a big rookery.



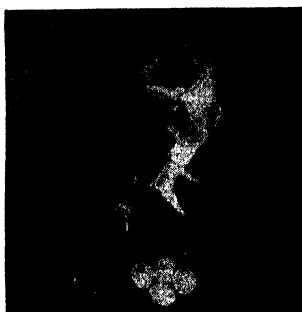
The magpie is an amusing talker, but a great thief.



The white-breasted crow eats animals that die in Africa, where its home is.



The jackdaw cannot help taking anything bright that catches his eye.



Here we have three fine owls. In the centre is the barn-owl with its eggs. On the right is the fierce hawk-owl. On the left is an eagle-owl catching a hare. Powerful and savage, it hunts in the day as well as at night. The photographs on these pages are by Lewis Medland, W. P. Dando, Oliver Pike, R. B. Lodge, A. Rudland, Messrs. Underwood & Underwood, London, and Gambler Bolton. Those of Mr. Gambler Bolton are published by permission of the Autotype Company, the owners of the copyright of all the photographs by that photographer which appear in this book.

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the wildest parts of the country, as far as possible from the homes of men.

It will eat grubs and so forth, but its favorite food is fish. It will kill hares and rabbits and other birds also. It attacks lambs, sick sheep, cattle, and deer, by pecking out their eyes. It used to be common all over the United States, but now is extinct, except in the Rocky Mountains. It also occurs in Alaska and along the Arctic coasts. Ravens are a large sort of crow.

THE MERCILESS CROW THAT ROBS NESTS, AND THE JOLLY LITTLE JACKDAW

The carrion-crow has a nature like the vulture and the raven, but the bird is smaller, and when it attacks a big living animal it cannot do its work single-handed, but advances in numbers. Its habit of eating putrid flesh is, of course, unpleasant, but it is of importance to the health of the place in which the crow finds its meals. Crows are merciless thieves. They rob other birds' nests, killing and eating the young ones, and even carrying off the unhatched eggs. To do this the crow thrusts his strong beak through one end of the egg, then carries the shell and its contents away as on a spear.

The jolly little jackdaw belongs to this family. It is not an American bird; but the magpie belongs to both continents. Its handsome plumage of glossy, greenish-black and white is a familiar sight in Europe, where everyone enjoys its bright ways; but in America it is a bird wholly of the Rocky Mountain region, where it is noticed principally for its queer noises and for the great covered nest of sticks which it heaps up in some thorn-tree. When tamed, it is an amusing talker.

One of the most singular of the birds of prey is the shrike, or butcher bird. It catches small birds, mice, and so on, and fixes their bodies upon thorns; then it can easily skin and eat such as it wants, leaving the others for the time to come when it is once more hungry.

THE OWL THAT COMES OUT WHEN BOYS AND GIRLS ARE GOING TO BED

Here we must say good-bye to the birds which hunt while the sun is up, and good-evening to the birds which fly by night—the owls. These are little known to young people, for they

are just going to bed when the owls are coming out. The owls of this country are purely nocturnal—night birds. One or two species abroad can see quite well in a bright light, but ours cannot. Their eyes are so formed that they can collect light from what to us is darkness. They can see when the daylight is not quite gone; but in the direct light of the sun they are quite dazed.

The owl works and feeds when we are asleep. It has eyes differently placed from those of any other bird—close together in front, so that it must look straight ahead. To make up for this, it can turn its head with the greatest ease in any direction. The power of its eyes in the darkness is quite wonderful. Most of us, if we were quite close to a field mouse or rat moving stealthily over a field, would do well to see it against the earth, like which its coat is colored. But the owl sees it from afar through the darkness, pounces noiselessly down, and seizes it. It can catch the mouse and the mole and the rat; it can catch fish as they rise to the surface of the water.

HOW THE COURAGE OF THE OWL GOES IN THE DAYTIME

There are about two hundred species of owls. Some are tiny owls; some are big eagle-owls, twenty-eight inches in length, very fierce and strong, ready to attack a man who goes near, and able to kill fawns and large game birds, and to do battle with the golden eagle. The courage of one of these owls goes in the daytime, and then little birds, led by a crow, may find it and mob it out into the open, and lead it a terrible dance. But when night comes, and the bird can see, none but a mighty eagle dare do battle with it. This owl is called in America "great horned."

The hawk-owl is one of the few owls which work by day. It is big and strong and savage. There are owls with great ear-tufts of feathers, and owls with none at all; some are snowy white, others are mottled. Some live in burrows with the prairie marmots; some make burrows for themselves. Mostly they live in hollow trees, or in church belfries or other high towers. Among so many owls, of course, there are those which do harm, but those in this country do more good than evil.

THE NEXT STORIES OF BIRDS BEGIN ON 1971.

The Book of STORIES



LORDS OF THE GREY & WHITE CASTLES

This story is another of the stories told by "Granny's Wonderful Chair," described on page 1045

ONCE upon a time there lived two noble lords in the east country. In the midst of his land each lord had a stately castle; one was built of the white freestone, the other of the grey granite. So the one was called Lord of the White Castle, and the other Lord of the Grey.

CONTINUED FROM 1812

The Lord of the Grey Castle had a little son, and the Lord of the White a little daughter; and when they feasted in each other's halls, it was their custom to say: "When our children grow up they will marry, and have our castles and our lands."

So the lords and their little children and tenants lived happily till one Michaelmas night, as they were all feasting in the hall of the White Castle, there came a traveler to the gate. He had seen many strange sights and countries, and, like most people, he liked to tell his travels. So the Lord of the White Castle said:

"Good stranger, what was the greatest wonder you ever saw in all your travels?"

"The most wonderful sight that ever I saw," replied the traveler, "was at the end of yonder forest, where in an ancient wooden house there sits an old woman weaving her own hair into grey cloth on an old crazy loom. When she wants more yarn she cuts off her own grey hair, and it grows so quickly that though I saw it cut in the morning, it filled

the room before noon."

When the traveler had gone on his way, the Lord of the White Castle could neither eat nor sleep for wishing to see the old woman that wove her own hair. At length he made up his mind to explore the forest in search of her ancient house, and told the Lord of the Grey Castle his intention.

So the two agreed to set out privately, lest the other lords of the land might laugh at them. The Lord of the White Castle had a steward who had served him many years, and his name was Reckoning Robin. To him he said:

"I am going on a long journey with my friend. Be careful of my goods, and, above all things, be kind to my little daughter Loveleaves till my return."

The Lord of the Grey Castle also had a steward who had served him many years, and his name was Wary Will. To him he said:

"I am going on a journey with my friend. Be careful of my goods, and, above all things, be kind to my little son Woodwender till my return."

So these lords kissed their children while they slept, and set out. The children missed their fathers; the tenants missed their lords. None but the stewards could tell what had become of them; but seven months wore away and they did not come back. The lords had thought their

stewards faithful, because they served so well under their eyes; but, instead of that, both were proud and crafty, and, thinking that some evil had happened to their masters, they set themselves to be lords in their place.

Reckoning Robin had a son called Hardhold, and Wary Will a daughter called Drypenny. Their fathers resolved to make a young lord and lady of them; so they took the silk clothes which Woodwender and Loveleaves used to wear to dress them, clothing the

they looked handsome as ever, while Hardhold and Drypenny grew crosser and uglier every day.

The crafty stewards did not like this. They thought their children ought to look genteel, and Woodwender and Loveleaves like young swineherds; so they sent them to a wilder pasture, still nearer the forest, and gave them two great black hogs, more unruly than all the rest, to keep.

One sultry day, about midsummer, Woodwender and Loveleaves sat down in the shadow of a mossy rock. Woodwender saw that the two great hogs were missing. Thinking they must have gone to the forest, the poor children ran to search for them, but, though they searched for hours, no trace of the favorite hogs could be seen.

At last they saw a lady coming along the path. In her right hand she carried a holly-branch, and the most remarkable part of her dress was a pair of long sleeves, as green as the very grass.

"Who are you?" she said. And the children told her their story, and how they had lost the hogs.

"Well," said the lady, "you are the fairest pig-keepers that ever came this way. Choose whether you will go home and keep pigs for Reckoning Robin and Wary Will, or live in the free forest with me."

"We will stay with you," said the children, "for we do not like keeping pigs!"

While they spoke, the lady slipped her holly-branch through the ivy, as if it had been a key.

Presently a door opened in the oak, and there was a fair house. When they stepped in, the lady said:

"A hundred years I have lived here, and my name is Lady Greensleeves. I have no friend or servant except my dwarf Corner, who comes to me at the end of harvest."

By this time the children saw how welcome they were. Lady Greensleeves gave them deer's milk and cakes of nut-flour, and soft green moss to sleep on; and they forgot all their troubles.



One night in walked a great bear. "Good-evening, bear!" said Lady Greensleeves. "What is the news in your neighborhood?"

lords' children in rags. The stewards' children sat at the chief tables, and slept in the best chambers, while Woodwender and Loveleaves were sent to mind the pigs and sleep on straw in the granary.

The poor children had no one to take their part. Every morning at sunrise they were sent out to watch a great herd of pigs on a wide, unfenced pasture hard by the forest. Still, Woodwender and Loveleaves comforted each other, saying their fathers would come back; so

All that summer Woodwender and Loveleaves lived with her in the great oak-tree; and the children would have been happy, but that they could hear no tidings of their fathers. At last the leaves began to fade, and the flowers to fall. Lady Greensleeves said that Corner was coming; and one moonlight night she set her door open, saying she expected some old friends to tell her the news of the forest. Then in walked a great brown bear.

"Good-evening, lady!" said the bear.

"Good-evening, bear!" said Lady Greensleeves. "What is the news in your neighborhood?"

"Not much," said the bear; "only the fawns are growing very cunning—one can't catch above three in a day."

"That's bad news," said Lady Greensleeves; and in flew a great black raven.

"Good-evening, lady!" said the raven.

"Good-evening, raven!" said Lady Greensleeves. "What is the news in your neighborhood?"

"Not much," said the raven; "only in a hundred years or so we shall be very private—the trees will be so thick."

"How is that?" said Lady Greensleeves.

"Oh!" said the raven, "have you not heard how the king of the forest fairies laid a spell on two noble lords who were traveling through his dominions to see the old woman that weaves her own hair? They had thinned his oaks every year, cutting firewood for the poor; so the king met them in the likeness of a hunter, and asked them to drink out of his oaken goblet, because the day was warm; and when the two lords drank they forgot their lands and their children, and thought of nothing in all this world but the planting of acorns, which they now do day and night in the heart of the forest, and will never cease till someone makes them pause in their work before the sun sets."

In the morning the children went to Lady Greensleeves and said:

"We have heard what the raven told

last night, and we know the two lords are our fathers; tell us how the spell may be broken!"

"I fear the king of the forest fairies," said Lady Greensleeves; "but I will tell you what you may do. At the end of the path which leads from this dell turn your faces to the north, and you will find a narrow way sprinkled over with black feathers—keep that path, and it will lead you straight to the ravens' neighborhood, where you will find your fathers planting acorns under the forest



In a great opening where the oaks grew thinnest, Loveleaves and Woodwender saw their fathers busy digging and planting acorns.

trees. Watch till the sun is near setting, and tell them the most wonderful things you know to make them forget their work; but be sure that you tell nothing but truth, and drink nothing but running water, or you will certainly fall into the power of the fairy king."

The children thanked her for this good counsel; and they soon found the narrow way sprinkled over with black feathers. On the evening of the seventh day they came into the ravens' neigh-

borhood, and in a great opening where the oaks grew thinnest, the children saw their own fathers busy digging and planting acorns. The children called them by their names, and ran to kiss them, each saying: "Dear father, come back to your castle and your people!"

But the lords replied:

"We know of no castles and no people. There is nothing in all this world but oak-trees and acorns."

Loveleaves and Woodwender sat down, and ate some food in great sorrow. When they had finished, both went to a stream hard by and began to drink the clear water; and as they drank there came through the oaks a gay young hunter, and in his hand he carried a huge oaken goblet. It was filled with milk up to the brim. And as the hunter came near he said: "Fair children, leave that muddy water, and come and drink with me." But Woodwender and Loveleaves answered: "Thanks, good hunter; but we have promised to drink nothing but running water."

Still the hunter came nearer with his goblet saying: "That water is foul; it may do for woodcutters, but not for such fair children as you. Were you not reared in palaces?" But the boy and girl answered him: "No; we were

reared in castles, and are the children of yonder lords; tell us how the spell that is upon them may be broken!" And immediately the hunter turned from them with an angry look, poured out the milk upon the ground, and went away with his empty goblet.

When the sun grew warm at noon, they went again to drink at the running stream. Then there came through the oaks another hunter, and in his hand he carried an oaken goblet, filled with mead to the brim. This hunter also asked them to drink, told them the stream was full of frogs, and asked them if they were not a young prince and princess. But when Woodwender and Loveleaves answered as before: "We have promised to drink only running water, and are the children of yonder lords; tell us how the spell may be broken!" he turned from them with an angry look, poured out the mead, and went his way.

All that afternoon the children worked beside their fathers, planting acorns with the withered branches; but the lords would take no notice of them or of their words. When the evening drew near, they were very hungry; so the children divided their last cake, and when no persuasion would make the lords eat with them, they went to the



The hunter turned from Woodwender and Loveleaves with an angry look, and poured the wine on the grass.

banks of the stream and began to eat and drink.

The ravens were coming home to their nests in the high trees; but one, that seemed old and weary, alighted near them to drink at the stream. As they ate the ravens lingered, and picked up the small crumbs that fell.

"Brother," said Loveleaves, "this raven must surely be very hungry or it would never come so close to us; let us give it a little bit, even though it is our last cake."

Woodwender agreed, and each gave a bit to the raven; but its great bill finished the morsels in a moment, and, hopping nearer, it looked them in the face by turns.

"The poor raven is still hungry," said Woodwender, and he gave it another bit. When that was gobbled, it came to Loveleaves, who gave it a bit too, and so on till the raven had eaten the whole of their last cake.

"Well," said Woodwender, "at least we can have a drink of water." But just as they stooped down to the water, there came through the oaks another hunter, and in his hand he carried a very large oaken goblet, filled to the brim with wine. He also said:

"Leave this muddy water, and drink with me."

But the children said:

"We will not drink anything except this water, and yonder lords are our fathers; please tell us how the spell may be broken!"

The hunter turned from them with an angry look, poured out the wine on the grass, and went his way. When he was gone, the old raven looked up into their faces, and said:

"I have eaten your last cake, and I will tell you how the spell may be broken. Before the sun sets, go to the lords, and tell them how their stewards used you, and made you mind pigs. When you see them listening, catch up their wooden

spades, and keep them, if you can, till the sun goes down."

Woodwender and Loveleaves thanked the raven, and, running to the lords, began to tell as they were bid. As the children related how they had been made to sleep on straw, how they had been sent to mind pigs, the acorn planting grew slower, and at last the lords dropped their spades. Then Woodwender, catching up his father's spade, ran to the stream and threw it in. Loveleaves did the same for the Lord of the White



Woodwender, catching up his father's spade, ran to the stream and threw it in. Loveleaves did the same for the Lord of the White Castle. The spell was then broken.

Castle. That moment the sun disappeared behind the western oaks, and the lords stood up, looking, like men newly awake, on the forest, on the sky, and on their children.

Woodwender and Loveleaves went home rejoicing with their fathers. The silk clothes and the best chambers were promptly taken from Hardhold and Drypenny and given to the lords' children again; and the wicked stewards, with their cross boy and girl, were sent to mind pigs.

As for Woodwender and Loveleaves, they met with no more misfortunes, but grew up, and were married, and inherited the two castles and the lands of their fathers. Nor did they forget the lonely Lady Greensleeves, for it was well known in the east country that she and her dwarf Corner always came to feast with them at Christmas-time, and at midsummer they always went to live for a time with her in the great oak in the forest.

THE KING'S DAUGHTER IN THE MOUNTAIN

THE STORY OF CUPID AND PSYCHE

IN the ancient days there lived in Greece a king who had three daughters. Psyche, the youngest daughter, was of remarkable beauty.

When she passed through the streets people threw down flowers for her to walk on. They worshipped her. But when the time came for her to marry, the king was commanded by a mysterious voice to take her to a wild mountain, and leave her there.

"Alas!" cried the people. "Our lovely Psyche is about to be sacrificed!"

And so, indeed, she was. The people had said that Psyche was more beautiful than Venus herself. Now, Venus was the Spirit of Beauty, and, though what the people said was true, Venus was very angry. She had a son named Cupid, who was the Spirit of Love, and she bade him marry Psyche to the ugliest creature on earth.

So when Psyche was placed on the mountain, a wind fairy came and carried her to a strange palace. There the maiden was waited on by unseen spirits, who played sweet music and served her with delicious food. But in the dark night someone came and spoke tenderly to her, and she fell in love with him, and consented to be his wife. Then he said:

"Psyche, you may do what you will in this palace which I have built for you. But one thing you must not do. You must not try to see my face."

He was very sweet and kind to her, but as he came only in the night-time, Psyche felt very lonely in the day-time. One day the wind fairy brought her sisters to see her, and they made her very unhappy. They told her that, by command of Venus, Cupid had married her to a monster.

"That's what your husband is!" they said. "And that's why he will not let you see his face!"

The next night Psyche lighted a lamp, and looked at her sleeping bedfellow. He was Cupid, the winged and radiant Spirit of Love! In her joy, Psyche tilted the lamp, and a drop of hot oil fell on his shoulder, and aroused him.

"Ah, Psyche!" he cried. "We must part. My mother will now know that I fell in love with you, and instead of

mating you to a monster, married you myself in secret. Farewell!"

And, spreading out his wings, he flew away. In the morning Psyche bravely set out to follow him, and, after sadly wandering over the world, she came to the palace of Queen Venus. There she remained as a servant, in the hope of seeing Cupid. But Venus recognized her, and, being more angry with her than before, she set her on dangerous tasks in order to bring about her death. Psyche, however, was so gentle and lonely and sorrowful that everything on earth took her part and helped her. Then Venus laid a plot against her.

"Take the Golden Casket to the Queen of the Dead," she said, "and ask her to fill it with the magic Ointment of Beauty."

Psyche knew that no mortal had ever returned from the Land of the Dead, and in her despair she climbed a tower to throw herself down and die. But the very stones took pity upon her, and said:

"Do not despair. You will find a way to the Land of the Dead on Mount Tartarus. Go there, and take two copper coins in your mouth and two honey-cakes in your hands."

Psyche gladly did so. She came to the Land of the Dead, and a ghostly ferry-man ferried her over the River of Death, and took one of her copper coins. Then a horrible dog with three heads sprang at her, but she fed him with a honey-cake, and he let her pass. The Queen of the Dead filled the Golden Casket, and by means of the last honey-cake and the last copper coin Psyche returned to the green, bright earth.

She then opened the casket to see what was inside. Alas, this was just what Venus had expected she would do! The casket was full of poisonous vapor. This vapor rushed up into Psyche's face and overcame her, and she fell down on the grass. But Cupid had been watching her in all her trials, and he now flew to her aid, and wiped the vapor from her face. Then, taking her in his arms, he spread out his wings, and carried her up to the Land of Immortality. And there they still live together in unending joy.

SPREADING OUT HIS WINGS CUPID FLEW AWAY



Psyche was so beautiful that Venus, the Spirit of Beauty, hated her, and sent Cupid to marry her to the ugliest creature on earth. But Cupid fell in love with her and married her in the dark, forbidding her to gaze on his face. One night Psyche lit a lamp, and when a drop of oil fell on Cupid and awakened him, he fled.

THE WISHING TABLE

A COUNTRY tailor had a goat, and his three sons used to take the goat out to feed in turn.

One day the eldest son took her to a churchyard, where she ate her fill of sweet grass. On the way home again he asked her :

"My goat, have you had enough to eat ?" And she answered :

"Not a blade could I touch,
I have eaten so much."

When she was safely back in the stable and the old tailor asked his son if she had had plenty to eat, he replied :

"Not a blade could she touch, she has eaten so much."

The tailor, however, feeling a little uncertain, went to the stable and asked the goat if she had really had enough to eat. To his great amazement, the goat answered :

"How can I but hungry feel,
As round the little graves I steal
And fail to get a proper meal ?"

The tailor was furiously angry, and, running to his son, he exclaimed :

"You have told me a lie in saying that the goat had plenty to eat, while all the time she is hungry !"

Then he seized his yard measure, and beat his son out of the house.

The next day the second son took the goat out to pasture, and exactly the same thing happened, with the result that the angry father drove him also out of doors. On the third day the remaining son took the goat out, and the same thing happened again.

The old tailor was now left alone, and had to take the goat out himself. He watched, and saw that she ate well, and towards evening he asked her :

"Have you had enough to eat, goat ?" And the goat replied :

"Not a blade could I touch,
I have eaten so much."

Then the tailor took her home and tied her up in the stable ; but before leaving her he said :

"Are you quite sure that you have had enough to eat for once ?"

Then, to his utter amazement, the goat gave the usual answer :

"How can I but hungry feel,
As round the little graves I steal
And fail to get a proper meal ?"

The tailor almost fell to the ground with astonishment, and he saw how unjustly he had treated his three sons. He decided to punish the goat, and did this in a very odd way, for he lathered the goat's head all over, and then shaved off all the hair. He next fetched his whip and drove the animal away.

In the meantime the eldest son went to a joiner's shop and spent many months in learning his trade. At the end of his apprenticeship his master, who was pleased with him, gave him a table which, though nothing extraordinary to look at, yet had one very curious quality. If anyone said to it, "Serve up a meal, table," it was instantly covered with a white cloth, with knives and forks, and dishes containing all kinds of nice food.

The young man now saw that he would never want for something to eat, and soon afterwards he decided to go back to his father to see if his anger had passed away. On his way home he had to stay one night at an inn where there were many guests. They invited him to share their supper, but he replied :

"I will give you a supper instead."

Then he set down his table in the middle of the room and said, "Serve up a meal, table," when it at once was covered with dishes of delicious food. All the guests sat down and enjoyed themselves greatly ; while the landlord, in a corner of the room, said to himself :

"I could make good use of such a table as that."

After the young man and his friends had gone to bed, the landlord changed the table for another of the same size that he happened to possess ; and in the morning the joiner went merrily off, never suspecting that he was carrying the wrong table.

When he reached home his father greeted him with great joy, and asked what that old table meant that he was carrying on his back. The son explained that it was a wishing table, and asked his father to invite a number of his friends, so that they might have proof of the table's power.

As soon as the guests had assembled, the son ordered the table to serve up a meal ; but, to his amazement, nothing

THE WISHING TABLE

whatever happened. He then saw that the table had been changed, and he was so greatly ashamed of having appeared to deceive his father that he ran away.

Meantime the second of the tailor's sons entered a mill to learn the business. At the end of his apprenticeship the miller made him a present of a donkey, remarking that it was a curious animal, for it would neither carry burdens nor go in harness. "But," added the miller, "this donkey yields gold. You have only to make it stand on a cloth and then call out 'Bricklebrit,' when a shower of sovereigns will fall out of his mouth." The young miller then decided to go back to his father, as he thought he saw his way to be a rich man all the rest of his life. On the way he had also to spend a night at the inn where his brother's table had been stolen.

After supper he asked for his bill, and on feeling in his pocket discovered that he had spent all his money. So he asked the landlord to wait a minute while he went to fetch some. He then started for the stable, carrying a tablecloth with him.

The landlord, being an inquisitive man, slipped out quietly after him, and watched through the keyhole of the stable door. There he saw his visitor spread the tablecloth on the ground, make the donkey stand on it, and at the magic word "Bricklebrit" a shower of sovereigns fell from the animal's mouth. The landlord then went quietly back into the house, where his guest presently joined him and paid his bill. During the night the wicked innkeeper got up, led

the golden donkey out of the stable, and put another one in its place.

On reaching home his father welcomed him warmly, but was by no means pleased to see the donkey. On hearing, however, what a wonderful animal this one was, he ran out and called his neigh-



As soon as the invited guests had all assembled, the eldest son ordered the table to serve up a meal; but, to his amazement, nothing whatever happened.

bors and friends together to see the donkey that could make money. The young miller then spread a cloth on the floor, led the donkey into the room, and called out "Bricklebrit." No gold, however, appeared, and the poor young

millar at once saw what a trick had been played upon him. He, in his turn, like his elder brother, was so ashamed that he went away.

But what had become of the younger son? He had apprenticed himself to a turner, and had worked hard to learn the trade. His brothers had written to him, and so he knew about their misfortunes with the table and the donkey.

At the end of his apprenticeship his master gave him a bag, saying:

"You will find a thick club inside it, and if anybody treats you badly, you have only to cry 'Out of the bag, club!' when it will jump out and keep beating your enemy until you say 'Back into the bag, club!'"

Soon afterwards this young man, in his turn, decided to go home. He also stayed at the inn where his brothers had lost their property, and, knowing what had happened, he was determined to punish the innkeeper. So at supper-time he put the bag on the table, and, without opening it, said that he had a treasure in it worth more than all the wishing tables and golden donkeys in the world. The covetous landlord, thinking that the bag must be full of diamonds, decided to get hold of them.

By and by the young man went to bed, and put the bag under his head for a pillow. When the landlord thought he was asleep, he crept softly into the room and began gently pulling at the bag. The young turner, who was really wide awake all the time, suddenly ex-

claimed, "Out of the bag, club!" and in a moment the stick was out and was soundly thrashing the landlord.

The young man sat laughing at him, and presently said:

"The club will never stop beating you until you give me the wishing table and the golden donkey."

The landlord was so exhausted with pain that he was glad enough to give up the stolen goods.

The next day the young man went home to his father, sent for his two brothers, and gave them back their property. Showers of sovereigns fell from the golden ass's mouth, and the wishing table was no sooner placed in the room than it was seen to be covered with a splendid meal. The poor old tailor had no more need to work, and he and his three sons lived in luxury and happiness ever after.

The goat who had caused all the trouble was so ashamed of her shaven head that she crept into a fox's hole. When the fox returned he was alarmed at the sight of this bald-headed creature with two horns, and ran off to his neighbor, the bear. The bear said that he would soon fetch it out, whatever it was; but one sight of the fiery eyes of the goat made him take to his heels. Just then a bee came along, and, hearing that some terrible creature was sitting in the fox's hole, he undertook to drive it out. So, settling on the shaven head of the goat, he stung her so violently that she fled away, and has not been heard of since.

THE TREASURE OF RHAMPSINITUS

ONCE upon a time there was a king in Egypt whose name was Rhampsinitus, who had so much money that he was afraid it would get stolen; so he sent for a clever mason and made him build a very strong room to hold all the treasure.

But he did not know that the mason had put one stone in the wall which he knew how to take out quite easily. Now, when the mason died he told his sons about the stone, and so they used to come by night and carry off as much money as they wanted, putting the stone back.

King Rhampsinitus was very angry when he found that there was less money every time he went to the treasure-house; so he put a trap there. One

night one of the brothers was caught in the trap. So he said to the other: "The king will certainly put me to death, and you cannot save me. But if you will cut my head off and take it away, no one will know who I am, and you will be safe." So the other brother cut his head off, and took it away, and buried it. But he very much wanted to bury the body, too, because the Egyptians cared very much about burying their dead properly.

Now, Rhampsinitus guessed that someone would try to get the body, and he hoped by that to find out who it was that had helped the dead man to rob him. So he had the body hung up in chains, and set some soldiers to watch.

THE TREASURE OF RHAMPSINITUS

Then the other brother brought a donkey past the place with two wine-bottles on its back, which were made of skins, in the Egyptian fashion. Just as he was passing, he opened one of the skins, so that the wine began to run out, and he set up a great outcry. Then the sentinels came to help him, and he pretended to be very grateful, and gave them the other wine-skin. But the wine in that was drugged, and the sentinels were very soon asleep; whereupon he carried off the body. But the soldiers were afraid to say that they had gone to sleep, and so they declared that the body must have been carried off by magic.

King Rhampsinitus was puzzled, but he hit upon what he thought was a clever idea. He made a proclamation that his daughter had made up her mind to marry the man who could give the best answer to some questions; but the suitors must all come to talk to her in the dark, so as to make sure that she made her choice without knowing who they were. But he told the princess that she was to make each suitor tell her the cleverest thing he had ever done.

Of course, the mason's son wanted to try his hand, but he expected that there was a trap of some sort.

So he made himself a dummy hand which felt just like a real hand if you took hold of it, and went to try his luck with the princess. Of course, when she asked her question, he said the cleverest thing he had done was tricking the guards. Now, this was just what Rhampsinitus had wanted.

"Dear me," said the princess, "that was clever! I shall choose you; give me your hand."

But the mason's son suspected her because of the way she said it, and in the dark he gave her the dummy hand, and immediately slipped out before she knew what had happened. Then Rhampsinitus saw that the robber was such a very clever person that he made another proclamation in which he declared that he should not only be granted a free pardon, but should really and truly marry the princess.

And the story says that the mason's son did marry the princess, and they lived happily to a good old age.

TALES TOLD BY THE INDIANS

THE ICE MAN AND THE GREAT FIRE

ONCE when the red men were in the woods, a spark from their fire set the trees ablaze, and burned them until the flames went down to the roots, making a great hole in the ground. Still the fire blazed away, and the hole got deeper and deeper, so that at last the red men feared the whole world would be burned up. Then they sought the Ice Man, who lives in the North.

"Oh, Ice Man," said they, "help us to put out the fire, or all the world will be burned up."

"Go back to the wood," answered the Ice Man, "and I will come to-morrow."

The messengers returned, and the next day, while they were watching for the Ice Man, there came a cold wind from the North. But this only seemed to fan the flames still higher and fiercer. Then the raindrops began to fall gently.

Then the wind became a whirlwind, and the rain became snow and hail, and, as they beat upon the fire, the flames became smoke and the red-hot rock became smouldering embers, and at last the

fire went out, and the world was saved. And now where the great hole was burned in the ground there is a large lake.

WHY THE SNOW COMES

The North went on a journey, and, after going a very long way, came to the South, where he fell in love with the South's daughter and asked for her.

"Oh, no!" said the South. "You cannot wed my daughter, for ever since you came here the weather has been so cold that we are all likely to freeze to death."

"Let me marry your daughter," said the North, "and take her to my home."

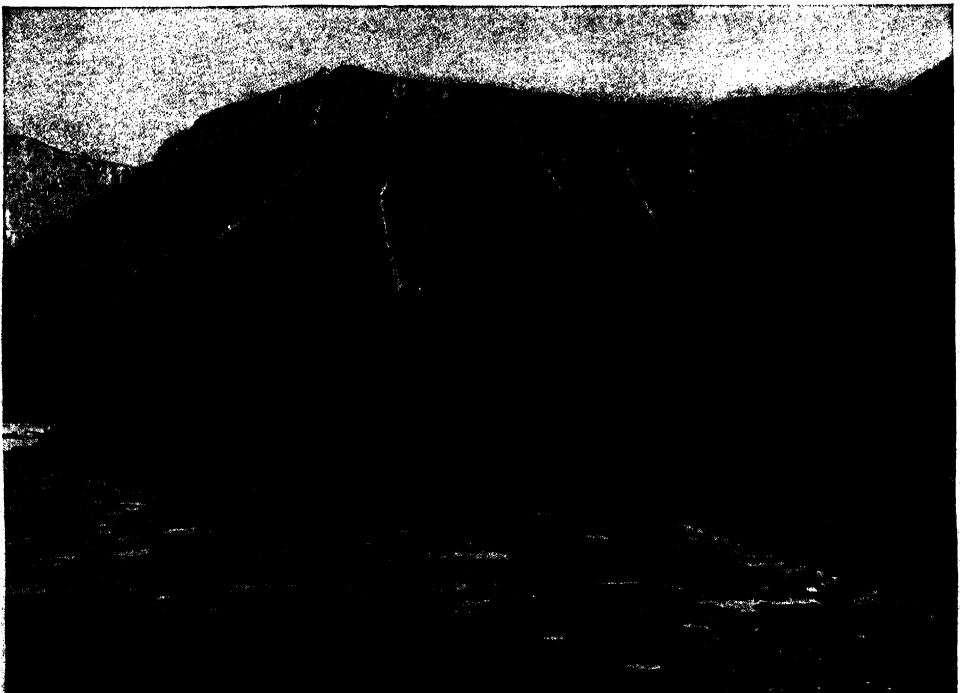
At last the South consented, and the North took back his bride to his own country, where the people lived in ice houses. But she had not been there long before the sun rose, the air grew warm, and the ice began to melt. Then the people of the North said that the bride must go back to her father, or they would have no homes left; and, although the North loved the daughter of the South, she had to return to her father's house, where sometimes the North visits her, and brings the winter snows.

THE NEXT STORIES ARE ON PAGE 1985.

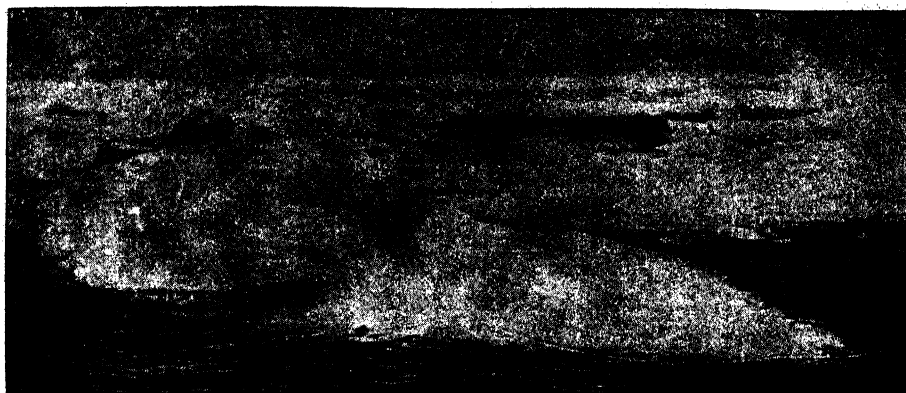
CANADIAN OUTPOSTS IN THE ARCTIC



BAFFIN'S BAY, SHOWING NORTHERNMOST INHABITED HOUSE IN AMERICA



ALBERT HARBOR, ALBERT LAND, IN THE ARCTIC REGIONS



DRIFTING ICE BOMBARDS THE COAST

UNKNOWN CANADA

IF there is any part of Canada which is unknown, how can I tell you anything about it? When I speak of parts of Canada as unknown, perhaps a better way of putting it would be to say "little known." And that is really what I mean. A very large part of the Dominion is little known in the sense that travelers have crossed it here and there, leaving wide stretches of country between their paths which have never been trodden by white men. Still other parts are absolutely unknown and unexplored.

You will, perhaps, think it very strange that nearly two-thirds of Canada is almost unknown to-day, and uninhabited save by bands of wandering Indians and a few Esquimaux. Yet northern Canada is an unexplored country in a sense which is not true even of Africa, and this for several reasons. The Canadian explorer in the north lands has to meet a very cold climate for the larger part of the year, and it is possible to live in such a climate only by being well provided with food, shelter and fuel.

But in northern Canada the food supply is very uncertain, as you can never tell where the wandering bands of caribou may be, and in the depth of winter they all go south. Fish can usually be obtained, but only at cer-

CONTINUED FROM 1771



tain places, and even there they sometimes fail the starving fisherman. Fuel is another very important necessity, and over a large part of the country northwest of Hudson Bay it is wholly lacking.

You may say: "Why not leave the work of exploration until warm weather comes?" First, because the summer lasts for such a short time—probably not more than two or three months—and in that time it is possible only to touch the fringe of the unknown country. And in summer the bogs and swamps are nearly or quite impassable, whereas in the cold weather King Frost makes them dry and firm.

UNGAVA, OR THE NEW QUEBEC

If you turn to a map of Canada, you will see a great triangular block of land between Hudson Bay on the west and the Atlantic Ocean on the east. If the map is a recent one, this huge country will be included in the Province of Quebec, of which it now forms a part. The true name is Ungava, or New Quebec, as some people now prefer to call it. Others call it Labrador, or the Peninsula of Labrador. It is truly a peninsula, as your map will show you; but it is not Labrador, for Labrador is the narrow strip

of land along the Atlantic side of the Peninsula, and it belongs, not to Canada, but to Newfoundland. You will find a description of the true Labrador in the article on Newfoundland.

In 1891 Mr. Packard, the well-known naturalist, wrote: "The Labrador Peninsula is less known than the interior of Africa or the wastes of Siberia." Since that time several exploring expeditions have told us something about the interior of this huge territory, but what Mr. Packard wrote in 1891 is still true to-day. However, the call of the unknown has a great attraction for many men, who do not hesitate to risk life and health to learn its secrets. One of them, Mr. Hubbard, lost his life from starvation in Ungava, but this did not stop his old friend, and even his wife, from continuing the search.

We learn from the writings of the government geologists and others, that Ungava is a tableland about 2,000 feet high, and that it slopes toward Hudson Bay and the Arctic Ocean. The Atlantic coast is much higher, and the rivers which flow into the Atlantic have worn deep ravines through the rocks and earth. These ravines are sometimes hundreds of feet deep and are very beautiful. The whole interior of the country is covered with a network of rivers and lakes.

This fact makes it possible to use canoes, but as many of the rivers are shallow and very rapid, the canoes and food have to be carried for long distances. And the great number of rivers makes it easy to get lost, for such maps as we have are poor, and a person is quite likely to go astray in a country where the rivers and lakes are so plentiful and look so much alike. Then, too, unless you carry with you enough food to last your journey, you may starve to death, for wild animals cannot be depended upon for food, and every fisherman knows that fish will not always take the fly or allow themselves to be caught in other ways.

THE PEOPLE OF UNGAVA

In the whole of Ungava there are probably no more than 3,000 people, and most of them are Indians. In the winter they live by hunting and trapping, but they generally move toward the coast for fish during a few weeks in the summer. The traps of one man may extend for a distance of fifty miles over the snowy

wastes, and it often takes him several days to visit them all. Many a time he finds nothing but bits of fur to reward him for all his toil, a sure sign that the sly and hungry wolverine has stolen a march upon him.

The Indians' great source of food has always been the caribou, but unfortunately they are fast being exterminated. These rather stupid animals move north in the summer, south in the winter, and the Indians hunt them while they are on their journeys. Then they travel in large herds, and these are most numerous at the shallow parts of rivers which they must cross. Here the Indians meet them, and great is the slaughter. But the real work of the Indians is trapping the fur-bearing animals, the skins of which they carry to the coast in the summer and sell to the fur-traders.

Will Ungava ever be a white man's land? It is hard to say. The soil is not good for farming, and the winters are very cold, but there are valuable forests, and there may be minerals. It is safe to say, however, that there will never be many white people there, though the country itself may bring a good deal of wealth to the older part of the Province of Quebec.

THE YUKON TERRITORY— THE GOLD COUNTRY

In the extreme northwest of Canada, a large territory, or district, has been separated from the Northwest Territories and is now known as the Yukon Territory. Here we find the famous Klondike mining camp, so well known, but a few years ago, for its valuable gold deposits. This country is most easily reached by boat from San Francisco, Seattle, or Vancouver, to Skagway at the head of the Lynn Canal, thence by rail to White Horse, and thence down the Yukon River to Dawson City, the most important centre in the Territory.

At the height of the gold rush, this was a busy little town, but, with the decrease in the gold output, it has lost a great many of its people, as has also the whole Territory, whose population of over 27,000 in 1901 had decreased to 8,500 in 1911. At first the gold was obtained by washing the soil in and near the river beds, a method known as placer mining. Now real mines are being sunk, and though there is less waste, the yield is much less while the cost at first is

SUMMER IN THE FAR NORTH



While some of the land in the Yukon is fertile, there are also scenes like this. Note the seams of rock of a different sort which have been forced up by some convulsion of nature. Evidently an avalanche has swept this side of the mountain. Notice the deep snow piled on the top.



Turn to your map of the Northwest Territories and look for the Great Slave Lake. Just where the Great Slave River flows into it is Fort Resolution, a post of the Hudson's Bay Company. The goods which the Indians are bringing from the landing will be exchanged for furs.

Photographs from Brown Bros.

greater and the miners do not make so much money as in the early days.

So, for the time being, the story of the Yukon has become to a great extent a story of the past, a past when fortunes were made in a few weeks, and still larger fortunes lost for ever. Such is nearly always the tale of mining countries, for a country cannot live by gold alone.

Of far greater interest is the chance that some day this territory may offer other and better methods of supporting the people who may go there. Here, as in the case of Ungava, we have to confess that we know little of the other kinds of wealth which the country may have.

We do know, however, that the southern part has a milder climate in winter than has the interior of Ungava, for while Ungava is washed on its northern and eastern borders by the cold Arctic currents, and on the west by the stormy waters of Hudson Bay, the Yukon is blessed with the warmer winds from off the great Pacific. The west coasts of all the continents are warmer than the eastern, and in this respect the Yukon is no exception to the rule.

The geological explorers tell us that the southern part of the Yukon, or a large part of it, is neither too cold nor too barren for the hardier grains and vegetables. Parts of it, too, are well wooded, but as long as there are other and more fertile portions of the Dominion to be had for the asking, and as long as the magnificent forests of British Columbia are left to us, we cannot expect that many people will choose the Yukon as a home. At present, in addition to the Indians, who live by trapping, hunting and fishing, the few white people in the Yukon are found either at the fur-trading posts or are engaged in mining.

THE NORTHWEST TERRITORIES

The Northwest Territories include all that part of the Canadian mainland which is not contained in the nine provinces or in the Yukon. They are bounded on the east by Hudson Bay, on the south by the enlarged province of Manitoba, Saskatchewan, Alberta, British Columbia, on the west by the Yukon Territory, and on the north by the Arctic Ocean. The southwestern portion of this area, particularly the valley of the Mackenzie River, is by all odds the most valuable.

In this part, trees are found in the valleys of the rivers almost as far north as the Arctic Ocean, and the hardier grains and vegetables can be grown nearly as far north as the trees extend. But we can never expect other than a sparse population here, except, perhaps, in the extreme south and near the rivers and lakes. The Mackenzie River itself is a very large stream, in places extremely beautiful. The most uninteresting part of its course is near its mouth, where the ground is low and marshy, and no trees grow.

Coal of poor quality is found in many places along its banks. Petroleum and natural gas are likewise found. Many years ago, when drilling for oil, gas was struck by the prospectors. The pressure was so great that it was impossible to stop the flow, and, to make matters worse, it was set on fire, and has been burning ever since, day and night, summer and winter alike.

THE BARREN LANDS

Most of the eastern part of the Northwest Territories is well named the Barrens, or Barren Lands. They are entirely bare of trees, and in winter the only wild animals found there are the musk-ox and wolverine, while the only sample of bird life is the ptarmigan, which is said to be found only where it is cold enough to freeze mercury. On their southern border, these Barren Lands are bounded by stunted trees, the northern limit of which extends toward the northwest from a point on Hudson Bay near Fort Churchill, to a point near the mouth of the Mackenzie River.

The trees are small and withered, like decrepit old men. An added touch of sadness and misery is given by the garments of "caribou" moss in which many of them are clothed. Farther south they are of course much larger and more vigorous, but the short summers and long winters of the north give them little chance to grow, so that a hundred years' growth on the border of the Barrens is perhaps no more than ten years' in the southern parts of Canada.

THE AWAKENING OF SUMMER

Following the long winter's sleep, the first warm days of summer—for there is no spring—make a great change in the Barrens. Large herds of caribou,

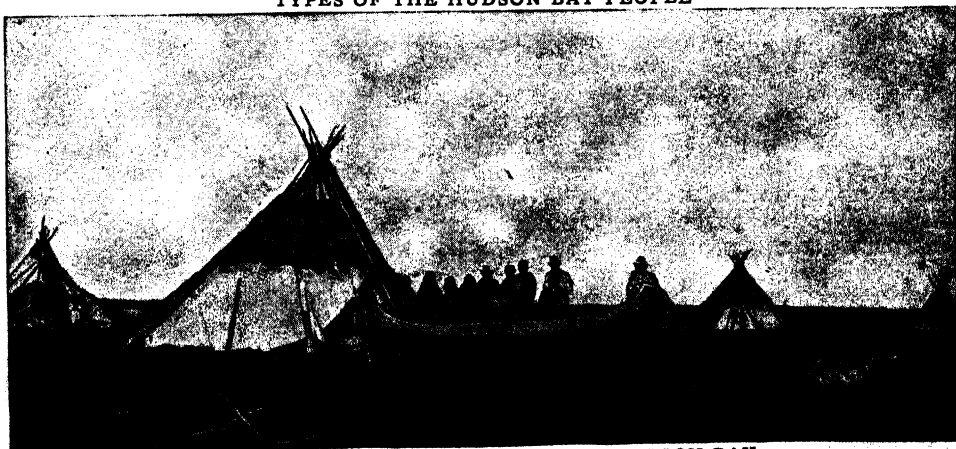
PEOPLE OF THE HUDSON BAY COUNTRY



ESQUIMAU GROUP ON THE GREAT WHALE RIVER



TYPES OF THE HUDSON BAY PEOPLE



BOAT BUILDERS AT FORT GEORGE, HUDSON BAY

These three pictures show us some of the types one may see in the great "unknown land" around Hudson Bay. We feel that their lives are full of hardship, but if they can secure food and clothing, they ask for little more. The caribou and other animals furnish the greater part of their food, and they are able to get, in exchange for the furs they have taken, enough of the white man's goods to satisfy their few remaining simple wants. These people have many good qualities, as all the visitors and explorers testify, though, of course, their ideas are not those of the white man. Whether civilization would make them happier is a doubtful question.

Photographs from Brown Bros.

which have spent the winter within the forest border, start on their summer journey toward the north, where their young are born. Geese, ducks, and other birds arrive from the south in immense flocks, and are soon busy feeding their little ones. Wild flowers of the hardier kinds are in bloom, and the moss which covers the Barrens starts into life.

THE REIGN OF WINTER

But this lasts only for two or three short months, for in September or October, winter starts his long reign again. The icy winds sweep down from the north, storm follows storm, and the Barrens are again left to the few musk-oxen, which still roam the wilds, and the hardy ptarmigan, for whom the cold has no terrors. The first visitors to leave are the summer birds, followed soon after by the caribou on their journey to the woods, which give them some protection from the harsh winter.

THE ESQUIMAUX AND INDIANS

At the extreme north of this inhospitable land, along the Arctic coast, the Esquimaux manage to support themselves during the whole year. In the winter they live in houses built of blocks of ice or snow, unlighted and unwarmed, save, by a seal-oil lamp or stove, for it serves the purpose both of a lamp and stove. Though explorers have been glad to accept their hospitality, their manner of life seems unbearable to us, especially during the depths of winter, when for weeks at a time the sun never shows his face above the horizon, and the nights are but little darker than the days.

On the other hand, at midsummer the sun never sets, so that there is constant daylight for some weeks. All this of course is true only within the Arctic circle where the Esquimaux live. And even winter's gloomy days are not entirely dark and dreary, for then the Northern Lights flash their gorgeous signals over King Frost's domain.

The Indians, unlike the Esquimaux, spend the most of the winter in the more hospitable west, but in the summer they make numerous raids into the Barrens to hunt the caribou, whose flesh forms their principal food. Even in the early winter, they are sometimes forced to leave their homes for the same purpose, and to bring in the supplies of caribou meat

which have been left behind during the summer's hunt.

THE LACK OF FUEL

The principal reason why the Barrens are a terror to the winter explorer is because there is no wood there for fuel, and so it must be carried from the border on dog-sleds. Now wood is very bulky, and only a small quantity can be taken. Therefore the winter journey into the Barrens must be a very short one. Many and many an Indian, after burning his tent poles and every scrap of wood, has in the end died miserably in this unhappy country. A few white men have made short dashes into the Barrens in winter, but their adventures have been far from pleasant.

Many have been attracted by the desire to see and hunt the musk-ox, that strange-looking beast, half sheep, half ox, the numbers of which are fast becoming less and less as the years roll by. Others have traveled across the Barrens on exploring expeditions, either sent by the government, or led by that love for the unknown which we all feel more or less. These men have generally traveled in summer as much as possible, and have followed the watercourses in their canoes.

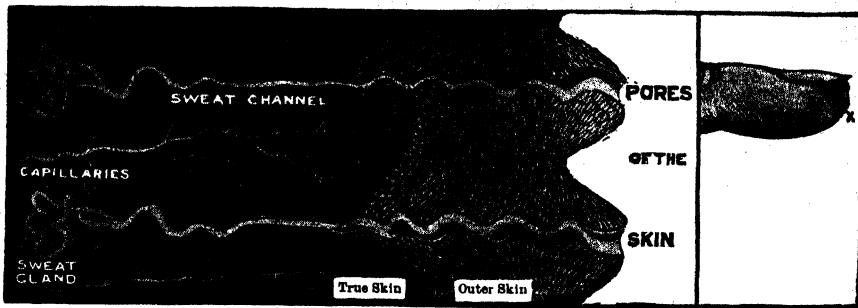
The lines of rivers and lakes which our maps of the Barrens show are the roads followed by these brave men. We know nothing about the vast area of land and water between these roads, but we can guess that it is not very different from the country which has been described by the travelers, and so we say that it is all equally barren and forbidding. There is a chance that minerals may yet be found there, but the chance is rather a poor one, as, so far, the geologists have seen nothing very promising.

THE ISLANDS OF THE ARCTIC OCEAN

Quite recently expeditions have been sent by water around the Atlantic coast to the islands in the Arctic Ocean beyond the Canadian mainland. It is pleasing to the pride of some Canadians to think that these islands have been taken possession of in the name of the King, but it is hard to see in what way they can ever be of any use. A few Esquimaux are found there, but probably white men will never be content to make their homes in these bleak, rocky fortresses.

THE NEXT STORY OF CANADA IS ON PAGE 2273.

The Book of OUR OWN LIFE



This is what our skin is like ; if we cut a finger where it is marked with a cross, this is how the cut would look if magnified. The surface of the skin, on the right, shows the ridges greatly enlarged.

THE SKIN AND ITS USES

SOME of us may think, perhaps, that the skin is not a very interesting part of the body, but that is very far from being the case. Even if we were only to think of the skin as a material, and were to compare it with silk or indiarubber or paper or cloth, we should find that it is far more wonderful than any of these, and that nothing which human beings can make is equal to it. But it is indeed far more than a material, for it is alive, and besides being the covering of our bodies, it is one of the instruments by which the brain is made acquainted with the outer world.

We know that if we do not have enough light, growth is interfered with, and the blood becomes pale. Also, we breathe more deeply under the influence of light ; and it has been proved that in a fixed time animals take in more oxygen and give out more carbon dioxide in the light than they do in the darkness. This is due to the effect of the light on the brain ; but it is not a direct effect, for the brain itself lives in darkness. It is due to the way in which certain nerves running to the brain are affected by light.

These are the nerves of the eyes and the nerves of the skin in general. For instance, an animal does not breathe so well or deeply if its eyes are bandaged. But the eyes are not alone responsible for helping the brain.

CONTINUED FROM 1805



The skin, also, has something to do with it, and this is true even though we can see by the eyes and not by the skin. It is good, then, to expose our faces and our hands to the light ; and sometimes, when people are ill, they are helped to get well again by taking what are called sun baths, when they take off their clothes and expose the skin to the light. It is the action of the light on the skin that also helps to make bathing in the open air so pleasant and healthful. It is probably rather a drawback to us that we cover up nearly the whole of our bodies so that light cannot play upon the skin ; but it is, at least, well that we should live in the light as much as possible, and let our faces and hands be exposed to it.

We must particularly remember that it is sunlight or daylight to which, through long ages, our bodies have become adapted. It is a great pity we do not use all the daylight we can. We suffer in health and strength through getting up many hours after the sun, and living by artificial light after the sun has set. Our bodies were certainly meant to live in the open air and in the light of day. Even the best ventilated building is not as good as open air, and the best kind of artificial light is not as good as daylight.

Now we may pass on to look at the way in which the skin is made, and

we may notice some facts about it which we can all see for ourselves without special means. In the first place, the skin is perfectly elastic. If this were not so we could not move our bodies; for every time we move, the skin is stretched somewhere, and then, by its elasticity, returns to its first position. Anyone can see this for himself by pushing the skin on the back of his hand into folds, and seeing how perfectly it comes back again. One or two cases have been described where people had skin which had lost its elasticity, and they found it as difficult to move as if they had been cased in stiff armor with no joints.

HOW IT IS THAT OUR FACES TELL SOMETHING ABOUT OUR CHARACTERS

Even the most elastic thing in the world, however, has limits to its power, and this is true of the skin. We notice that as the years pass the skin of the face begins to show lines and folds according to the way in which it has been moved. This depends upon our feelings. The bright and happy person shows his feelings by moving the skin of his face in a particular way; so does the person who is always thinking; so does the person who is gloomy and always worries. In the course of time lasting marks are made in the skin of the face, telling us something about the character of the person. The best kind of beauty of the skin lasts all one's life, and depends upon the kind of life we have lived. Age makes it only more beautiful.

One of the marks of age in the skin is that it loses its elasticity. Often, also, it becomes very thin. In extremely old people the wrinkles that used to be present in the face often disappear, and the skin becomes thin and smooth. But we must pass to other features of this wonderful material.

WHY THE SKIN IS THE MOST WONDERFUL WATERPROOF MATERIAL IN THE WORLD

The skin has a very beautiful texture. This has been compared to velvet, to the skin of a peach, and so on; but there is nothing else which has all the qualities of the surface of the skin when it is well cared for and has not been too much exposed to rough weather. We are so made that this gives us pleasure. Everyone likes to rub his finger against the cheek of a child, for there is nothing

else that feels quite so nice. Another most important feature of this material is that it is waterproof, but in one direction only. By means of certain special arrangements in the skin, it is able to take water from the blood and allow it to escape; but water cannot enter through the skin, not even through the little channels by which the sweat, or perspiration, comes out. It is, of course, most important that the skin should be waterproof, and yet it is also most important that it should be able to remove water from the blood, as we shall see. It would be hard to find any other material allowing water to pass through it in one direction, while being perfectly waterproof in the other direction.

The first use of the skin that occurs to anyone is, of course, that it protects all the tissues underneath it from dirt. If the outside of the skin were itself alive, it would be bound to suffer very seriously from the dirt which it so often encounters; but almost the most remarkable thing about the skin is that, though it is a product of life, yet the outside of it is not really alive, just as the tip of a nail is not really alive.

THE OUTER SKIN THAT IS NOT ALIVE, AND THE INNER SKIN THAT IS ALIVE

The outside of the skin, indeed, is made of very much the same material as the nails are made of, or the hoofs of a horse, or various kinds of horns. Every time we wash—indeed, every time the skin is rubbed at all—a great deal of its outer layer is rubbed off. When we come to study the skin closely we find that it may quite distinctly be divided into two layers, an outer and an inner layer. The Latin name for the skin is *dermis*, and the inner layer of the skin is called the *dermis*, or true skin. It is really alive; it bleeds when it is pricked, and it hurts when it is touched. The layer that lies outside it is called the *epidermis*—*epi* simply meaning *upon*.

This epidermis is made by the dermis, and is being constantly renewed from moment to moment as it is rubbed off. It has no feeling in it, for there are no nerves in it, and it can be rubbed off, or can even have a needle passed through it without bleeding, for it has no blood-vessels in it. You know that it is

quite easy to pass a needle through the skin at the tip of a finger without feeling anything, and without drawing any blood. The epidermis is very thick there, and you simply pass the needle through that. It is the epidermis that grows over the base of the nails. If you are reading very carefully, you will say that anything which grows must be alive, and we have just said that the epidermis is not alive. That is perfectly true. The thin skin that grows on the base of the nail is not alive, and does not grow itself. It is really pushed from behind by the new cells which the true skin is forming behind it.

HOW THE SKIN IS EVER CHANGING & THE LIVING CELLS PUSH UPWARDS AND DIE

The whole skin is made of cells—both the true skin and the outer skin, or epidermis. The cells of the true skin are alive, and when they grow to a certain point they divide into two, and make new cells. This goes on always. It is in the deeper layers of the skin that it goes on; and so it happens that the cells which have been already made are pushed upwards and outwards towards the surface by the young cells formed beneath them. After a time the old cells die; they become thin and flat and horny, and it is they that form the epidermis, or outer skin. They protect the true skin, and the whole of the rest of the body. A great deal of dirt from outside soaks into them, but soon they are rubbed away, and other cells take their places. In this way we are able to keep the surface of the body clean from day to day. The true skin contains much more in it besides the cells which grow and divide and make the epidermis, but the epidermis itself has no other structures in it, and nothing more need be said about it.

THE LITTLE TUBES THAT CARRY OFF THE WATER FROM OUR BODIES

Any part of the body which has the business of making special fluids is called a gland; glands in the stomach, for instance, make the digestive juices. Now, we find that the true skin contains a large number of glands which have a special purpose; they are called sweat-glands, and consist simply of a long coiled tube, the end of which passes through the epidermis, and opens on the surface of the skin. This tube is

lined with cells, and outside them is a rich supply of capillary blood-vessels. In every part of the skin we find these sweat-glands, and they are working nearly all the time. We must not think that we sweat, or perspire, only when we can see visible drops standing on the skin. That only happens when the sweat-glands are very actively at work. But even during an ordinary day, when you have never noticed at all that you are perspiring, the skin discharges about 25 ounces of sweat.

If we desire to examine sweat to find what it is made of, we must go to some part of the skin where there is no hair, for hairs have little glands of their own which are of a different kind. You will guess for yourself, then, that the place to go to is the palm of the hand or the sole of the foot, where no hair is to be found in anybody. When we examine the sweat thus obtained, we find that it is 99 per cent. water; the remaining 1 per cent. is made up of a number of things, including common salt. Sweat is slightly acid when it is produced.

THE STREAM OF WATER CONSTANTLY FLOWING THROUGH THE BODY

In course of time the watery part of sweat passes into the air as water-vapor, but the solid part is left upon the skin, as the salts of sea-water are left in the sea when the water passes into the air. Even the cleanest skin contains many microbes, and some of these act upon the solids that are left from the sweat, so that they are changed into something else that is unpleasant. This is one of the chief reasons for keeping the skin clean.

The production of sweat is one of the most useful things that the skin does. Some of the solids of sweat are poisonous substances that the body needs to be rid of, so that the skin, through its sweat-glands, is one of the channels, like the lungs, by which we dispose of the waste products of our lives. But we must not think that there is no use in the 99 per cent. of water that is found in sweat. For one thing, it is good in itself that there should be a constant stream of water through the body, because water helps most chemical actions, and also because it helps to dissolve and carry away

things we do not want. But the water in the sweat has a special use which is of great importance.

It is necessary for the health of all the higher animals, and specially necessary for our health, that the temperature of the body should be kept at a fixed point, no matter whether it is summer or winter, day or night.

HOW OUR BODIES ARE KEPT COOL IN SUMMER AND WARM IN WINTER

There must be some way, then, of regulating the temperature, and this is done mainly by means of the sweat. In very hot weather it is necessary for us to keep cool. The body must lose much heat somehow or its temperature will rise above the fixed point necessary for our health. So we produce a great deal of sweat, as everyone knows, and when the water in it leaves the skin it takes away a great deal of heat from our bodies. The same thing happens even if we put water on the skin from the outside. If, next time you wash your hands, you dry only one of them, you will very soon find that what we call the evaporation of the water from the wet hand makes it much cooler than the other. Then, on a very cold day, when we need to keep all the heat we can, we perspire only very slightly. Thus, the figure quoted above—25 ounces per day—is only an average figure. The amount of sweat produced depends chiefly upon the body's need for heat.

You must have noticed a dog lying panting, with its mouth wide open, on a very hot day. The dog has sweat-glands only on the skin of the pads of its feet, and so it practically cannot use our method of keeping cool on a hot day. That is why it suffers so much from the heat, and has to breathe quickly so as to get rid of as much water as possible by its lungs.

WHAT HAPPENS, WHEN THE WEATHER IS WHAT WE CALL "CLOSE"

Then, again, you must have noticed how uncomfortably hot you become when the weather is what we call "close." On another day the sun may be as hot or hotter, yet we do not feel oppressed at all. The reason is that on the days which we call close, or muggy, there is a great deal of water already in the air. Now, the more water there is in the air, the more slowly can it take up any

extra water. Indeed, sometimes the air may be so full of water that it will practically take up no more. This means that the sweat cannot evaporate from the skin, and so we cannot become cool in this way. We are as badly off for the time as the dog, which can scarcely sweat at all. But on other days, though the heat of the sun may be intense, and though the air around us may be just as hot, yet it may happen to contain only a little moisture, and so our sweat evaporates quickly, and keeps us cool, and we do not find the heat oppressive at all.

Now, there must be some way in which the sweat-glands are controlled. There must be some centre which orders them to act as they are needed. This is so. The sweat-centre lies in the lower part of the brain, and from it nerves proceed which carry its orders to the millions of sweat-glands in the skin. Then, when the blood becomes too hot, the sweat-centre in the brain which has the hot blood passing through it gives an order, and the sweat-glands are set in vigorous action. There are various other ways in which the sweat-centre may be disturbed; for instance, a person may sweat in great fear, even though he is quite cold.

DRUGS THAT ACT ON THE TINY SWEAT-CENTRE IN THE BRAIN

But sometimes the sweat-centre is poisoned and does not act properly. For instance, during fever, the blood is too hot, and it is very desirable that we should sweat; yet the skin is both hot and dry. There are many drugs known which prevent sweating, and some which produce sweating. The most remarkable of these comes from an African plant, and a mere fraction of a grain of it will make the skin simply run with perspiration. Then there is another drug which comes from the plant called the deadly nightshade, and a still smaller dose of that will prevent all sweating for many hours. In both cases these doses are so very tiny that they could not possibly act as they do if they had to be spread out over all the sweat-glands. But they act on the tiny sweat-centre in the brain, and that is why so little of them can produce such powerful results. A little whisper in the king's ear may do more than much shouting in the streets!

THE NEXT PART OF THIS IS ON PAGE 198.

The Book of POETRY

A CHILDREN'S POEM BY WORDSWORTH

IN the poetry of William Wordsworth there is much tender sentiment expressed in simple words which the youngest reader could not fail to understand. His poetry is at times not of a very high order, though he is capable of the best ; but it is always redeemed by tender and just sentiment. That may be said of his poem "The Pet Lamb." The poet says "the dew was falling fast." Now, the dew does not fall ; it rises. But this is what we call "poetic license." As poetry is not the mere statement of fact, but the expression of the imagination, it must not be bound by the same rules as the describing of a machine. The poet is allowed to use words that suggest to the mind ideas and pictures which, though not strictly true, may be more beautiful than fact, and all such departures from the mere fact are called "poetic license," meaning that the poet has taken this liberty for the sake of poetic effect.



THE PET LAMB



THE dew was falling
fast, the stars began
to blink ;

I heard a voice ; it said, "Drink,
pretty creature, drink !"

And looking o'er the hedge, before me I
espied

A snow-white mountain lamb, with a
maiden at its side.

Nor sheep nor kine were near ; the lamb
was all alone,
And by a slender cord was tether'd to a
stone ;

With one knee on the grass did the little
maiden kneel,
While to that mountain lamb she gave its
evening meal.

The lamb, while from her hand he thus his
supper took,
Seem'd to feast with head and ears ; and his
tail with pleasure shook :

"Drink, pretty creature, drink !" she said
in such a tone
That I almost received her heart into my
own.

'Twas little Barbara Lewthwaite, a child of
beauty rare !

I watch'd them with delight ; they were a
lovely pair.

Now with her empty can the maiden turn'd
away ;

But ere ten yards were gone, her footsteps
did she stay.

Right towards the lamb she look'd, and from
that shady place

I unobserved could see the workings of her
face ;

If nature to her tongue could measured
numbers bring,

Thus, thought I, to her lamb that little maid
might sing :

"What ails thee, young one—what ? Why
pull so at thy cord ?

Is it not well with thee—well both for bed
and board ?

Thy plot of grass is soft, and green as grass
can be ;

Rest, little young one, rest ; what is't that
aileth thee ?

CONTINUED FROM 1876



"What is it thou wouldst
seek ? What is wanting
to thy heart ?

Thy limbs, are they not strong ?
—and beautiful thou art !

This grass is tender grass ; these flowers
they have no peers,
And that green corn all day is rustling
in thy ears.

"If the sun be shining hot, do but stretch
thy woollen chain ;

This beech is standing by, its covert thou
canst gain ;

For rain and mountain storms, the like thou
need'st not fear,

The rain and storm are things that scarcely
can come here.

"Rest, little young one, rest ; thou hast
forgot the day

When my father found thee first in places far
away ;

Many flocks were on the hills, but thou wert
own'd by none.

And thy mother from thy side for evermore
was gone.

"He took thee in his arms, and in pity
brought thee home ;

A blessed day for thee !—Then whither
wouldst thou roam ?

A faithful nurse thou hast ; the dam that
did thee yearn

Upon the mountain-tops no kinder could
have been.

"Thou know'st that twice a day I have
brought thee in this can

Fresh water from the brook, as clear as
ever ran ;

And twice in the day, when the ground is wet
with dew,

I bring thee draughts of milk, warm milk it is
and new.

"Thy limbs will shortly be twice as stout as
they are now,

Then I'll yoke thee to my cart like a pony in
the plough !

My playmate thou shalt be ; and when the
wind is cold

Our hearth shall be thy bed, our house shall
be thy fold.

"It will not, will not rest!—Poor creature,
can it be
That 'tis thy mother's heart which is working
so in thee?
Things that I know not of belike to thee are
dear,
And dreams of things which thou canst neither
see nor hear.

"Alas, the mountain-tops that look so green
and fair!
I've heard of fearful winds and darkness that
come there;
The little brooks that seem all pastime and
all play,
When they are angry, roar like lions for their
prey.

"Here thou need'st not dread the raven in
the sky;
Night and day thou art safe—our cottage is
hard by.
Why bleat so after me? Why pull so at thy
chain?
Sleep—and at break of day I will come to
thee again!"

As homeward through the lane I went with
lazy feet,
This song to myself did I oftentimes repeat;
And it seem'd, as I retraced the ballad line
by line,
That but half of it was hers, and one half of
it was *mine*.

Again, and once again, did I repeat the song;
"Nay," said I, "more than half to the damsel
must belong!"
For she look'd with such a look, and she spake
with such a tone,
That I almost received her heart into my own."

GINEVRA

This poem in blank verse by Samuel Rogers tells simply one
of the most dramatic stories that could be conceived. The
legend of the awful chest is told of several English houses,
but is probably of Italian origin. Let us hope it never was
true. But the tale contains a warning to us to act always
with prudence, and exercise forethought, even when jesting.

IF thou shouldst ever come by choice or
chance

To Modena, where still religiously
Among her ancient trophies is preserved
Bologna's bucket (in its chain it hangs
Within that reverend tower, the Guirlandine),
Stop at a palace near the Reggio gate,
Dwelt in of old by one of the Orsini.
Its noble gardens, terrace above terrace,
And rich in fountains, statues, cypresses,
Will long detain thee; thro' their arched walks,
Dim at noonday, discovering many a glimpse
Of knights and dames, such as in old romance,
And lovers, such as in heroic song,
Perhaps the two, for groves were their delight,
That in the springtime, as alone they sat,
Venturing together on a tale of love,
Read only part that day. A summer sun
Sets ere one half is seen; but ere thou go,
Enter the house—pry thee, forget it not—
And look a while upon a picture there.

'Tis of a lady in her earliest youth,
The very last of that illustrious race,
Done by Zampieri—but I care not whom.
He who observes it, ere he passes on,

Gazes his fill, and comes and comes again,
That he may call it up when far away.

She sits, inclining forward as to speak,
Her lips half open, and her finger up,
As tho' she said, "Beware!" Her vest of gold
Broider'd with flowers, and clasped from head
to foot,

An emerald stone in every golden clasp;
And on her brow, fairer than alabaster,
A coronet of pearls. But then her face,
So lovely, yet so arch, so full of mirth,
The overflowings of an innocent heart—
It haunts me still, tho' many a year has fled,
Like some wild melody!

Alone it hangs
Over a mouldering heirloom, its companion,
An oaken chest, half eaten by the worm,
But richly carved by Antony of Trent
With Scripture stories from the life of Christ;
A chest that came from Venice, and had held
The ducal robes of some old ancestor.
That by the way—it may be true or false—
But don't forget the picture; and thou wilt
not

When thou hast heard the tale they told me
there.

She was an only child; from infancy
The joy, the pride of an indulgent sire.
Her mother dying of the gift she gave—
That precious gift—what else remained to
him?

The young Ginevra was his all in life,
Still as she grew, for ever in his sight;
And in her fifteenth year became a bride,
Marrying an only son, Francesco Doria,
Her playmate from her birth, and her first
love.

Just as she looks there in her bridal dress,
She was all gentleness, all gaiety,
Her pranks the favourite theme of every
tongue.

But now the day was come, the day, the hour;
Now, frowning, smiling, for the hundredth
time,

The nurse, that ancient lady, preach'd de-
corum;

And, in the lustre of her youth, she gave
Her hand, with her heart in it, to Francesco.

'Great was the joy, but at the bridal feast,
When all sat down, the bride was wanting
there.

Nor was she to be found! Her father cried,
"'Tis but to make a trial of our love!"

And filled his glass to all; but his hand shook,
And soon from guest to guest the panic
spread.

'Twas but that instant she had left Francesco,
Laughing, and looking back, and flying still,
Her ivory tooth imprinted on his finger.
But now, alas! she was not to be found;
Nor from that hour could anything be guessed,
But that she was not!

Weary of his life,
Francesco flew to Venice, and forthwith
Flung it away in battle with the Turk.

Orsini lived; and long might'st thou have
seen

An old man wandering as in quest of some-
thing,

Something he could not find—he knew not
what.

When he was gone, the house remain'd a while
Silent and tenantless—then went to strangers.

Full fifty years were passed, and all forgot,
When on an idle day—a day of search
Mid the old lumber in the gallery,
That mouldering chest was noticed; and
‘twas said

By one as young, as thoughtless as Ginevra,
“Why not remove it from its lurking-place?”
‘Twas done as soon as said; but on the way
It burst, it fell; and lo! a skeleton,
With here and there a pearl, an emerald stone,
A golden clasp, clasping a shred of gold.
All else had perished—save a nuptial ring,
And a small seal, her mother’s legacy,
Engraven with a name—the name of both—
“Ginevra.”

There then had she found a grave!
Within that chest had she concealed herself,
Fluttering with joy, the happiest of the
happy;
When a spring-lock that lay in ambush there
Fastened her down for ever!

THE QUEEN & THE FLOWERS

Since the fourteenth century England has had a Poet Laureate, originally chosen from the poets of the day to celebrate the great events in the history of the country, but who is no longer under any such obligation. The following poem, from “Fortunatus, the Pessimist,” was written by a former Poet Laureate, Mr. Alfred Austin, who died in the year 1913. He here retells in simple tuneful verse an old and beautiful legend.

THERE was a king in olden days
With black heart, scowling forehead.
The mighty trembled at his gaze,
And his sceptre was abhorred.

Alike to burgher and to boor
His grasp was hard and greedy:
He had no pity for the poor,
Indulgence for the needy.

Beside him sat a gentle queen,
Compassionate and holy,
Who fed the hungry, clad the mean,
And comforted the lowly.

Till with harsh words he her forbade
To visit, cheer, or aid them.
Then meekly, though her heart was sad,
She listened, and obeyed them.

It happened, one day, in hovel rude
A leper lay a-dying;
And there was none to take him food,
And none to soothe his sighing.

Forgetting all, with bread and meat
She filled a little wallet,
And, sallying out into the street,
Made haste to reach his pallet.

When lo! the king, with courtiers girt,
Came riding through the city.
The queen in terror raised her skirt,
To screen her work of pity.

Seeing her shrink and bow her head,
His brow began to pucker:
“Now show me what it is,” he said,
“You hide below your tucker.”

She spoke not, but uncovered it;
And look what it discloses!
Not wheaten loaf and dainty bit,
But myrtles, pinks, and roses.

“What gauds are these?” he fumed and cried,
“And wherefore were they hidden?”
“I disobeyed you,” she replied,
And trembled to be chidden.

“Food was I taking where, ah, me!
A lonely leper cowers;
But the Lord Jesus, as you see,
Hath changed them into flowers.”

The king dismounted from his horse,
First smelt pink, rose, and myrtle,
Then knelt, and, smitten with remorse,
Kissed her white hands and kirtle.

Henceforth he held no sumptuous state
In courtyard, hall, or stable;
The poor were welcomed at his gate,
The hungry at his table.

When died his queen, and in the tomb
Was laid with pomp and wailing,
Myrtle at once began to bloom,
And climb round slab and railing.

And even when the snow lies white,
And frosty stars are shining,
Clove pinks about her grave are bright,
And round it roses twining.

TO THE CUCKOO

William Wordsworth’s ode to the cuckoo may be compared with that of Michael Bruce. Perhaps the most beautiful idea in Wordsworth’s poem is the fourth line of the first verse.

O BLITHE new-comer! I have heard,
I hear thee and rejoice:
O Cuckoo! shall I call thee bird,
Or but a wandering voice?

While I am lying on the grass
Thy twofold shout I hear;
From hill to hill it seems to pass,
At once far off and near.

Though babbling only to the vale
Of sunshine and of flowers,
Thou bringest unto me a tale
Of visionary hours.

Thrice welcome, darling of the Spring!
Even yet thou art to me
No bird, but an invisible thing—
A voice, a mystery.

The same whom in my schoolboy days
I listen’d to; that cry
Which made me look a thousand ways
In bush, and tree, and sky.

To seek thee did I often rove
Through woods and on the green;
And thou wert still a hope, a love;
Still long’d for, never seen!

And I can listen to thee yet;
Can lie upon the plain
And listen, till I do beget
That golden time again.

O blessed bird! the earth we pace
Again appears to be
An unsubstantial fairy place
That is fit home for thee!

A SONG OF THE CAMP

"A Song of the Camp" by Bayard Taylor has such a wonderful swing and pathos to it that it fairly carries us off our feet.

"GIVE us a song!" the soldiers cried,
The outer trenches guarding,
When the heated guns of the camp allied
Grew weary of bombarding.

The dark Redan, in silent scoff,
Lay grim and threatening under;
And the tawny mound of the Malakoff
No longer belched its thunder.

There was a pause. A guardsman said:
"We storm the forts to-morrow;
Sing while we may, another day
Will bring enough of sorrow."

They lay along the battery's side,
Below the smoking cannon;
Brave hearts from Severn and from Clyde,
And from the banks of Shannon.

They sang of love, and not of fame;
Forgot was Britain's glory;
Each heart recalled a different name,
But all sang "Annie Laurie."

Voice after voice caught up the song,
Until its tender passion
Rose like an anthem, rich and strong,—
Their battle-eve confession.

Dear girl, her name he dared not speak,
But, as the song grew louder,
Something upon the soldier's cheek
Washed off the stains of powder.

Beyond the darkening ocean burned
The bloody sunset's embers,
While the Crimean valleys learned
How English love remembers.

And once again a fire of hell
Rained on the Russian quarters,
With scream of shot and burst of shell,
And bellowing of the mortars!

And Irish Nora's eyes are dim
For a singer dumb and gory;
And English Mary mourns for him
Who sang of "Annie Laurie."

Sleep, soldiers! still in honoured rest
Your truth and valour wearing;
The bravest are the tenderest,—
The loving are the daring.

THE AMERICAN FLAG

All Americans owe a great debt of gratitude to Joseph Rodman Drake for writing the stirring poem entitled "The American Flag." The swinging verses cannot fail to create a glow of real feeling in every true patriot of the broad land.

WHEN Freedom, from her mountain height,
Unfurled her standard to the air,
She tore the azure robe of night,
And set the stars of glory there!

She mingled with its gorgeous dyes
The milky baldric of the skies,
And striped its pure celestial white
With streakings of the morning light,
Then, from his mansion in the sun,
She called her eagle-bearer down,
And gave into his mighty hand
The symbol of her chosen land.

Flag of the seas! on ocean's wave
Thy star shall glitter o'er the brave;
When Death, careering on the gale,
Sweeps darkly round the bellied sail,
And frightened waves rush wildly back
Before the broad-side's reeling rack,
The dying wanderer of the sea
Shall look, at once, to heaven and thee,
And smile, to see thy splendours fly,
In triumph, o'er his closing eye.

Flag of the free heart's hope and home,
By angel hands to valour given!
Thy stars have lit the welkin dome,
And all thy hues were born in heaven!
And fixed as yonder orb divine,
That saw thy bannered blaze unfurled,
Shall thy proud stars resplendent shine,
The guard and glory of the world.
For ever float that standard sheet!
Where breathes the foe but falls before
us?
With Freedom's soil beneath our feet,
And Freedom's banner streaming o'er us!

DOUGLAS, DOUGLAS, TENDER AND TRUE

This well-known poem was written by Dinah Maria Mulock.

COULD ye come back to me, Douglas,
Douglas,
In the old likeness that I knew,
I would be so faithful, so loving, Douglas,
Douglas, Douglas, tender and true.

Never a scornful word should grieve ye,
I'd smile on ye sweet as the angels do;—
Sweet as your smile on me shone ever,
Douglas, Douglas, tender and true.

O to call back the days that are not!
My eyes were blinded, your words were
few;
Do you know the truth now up in heaven,
Douglas, Douglas, tender and true?

I never was worthy of you, Douglas,
Not half worthy the like of you;
Now all men seem to me like shadows—
Douglas, Douglas, tender and true.

Stretch out your hand to me, Douglas,
Douglas,
Drop forgiveness from heaven like dew,
As I lay my heart on your dead heart,
Douglas,
Douglas, Douglas, tender and true.

AS DOWN IN THE SUNLESS RETREATS

This poem by Thomas Moore shows him in a different mood from his other verses we have quoted in our Book of Poetry.

AS down in the sunless retreats of the ocean
Sweet flowers are springing no mortal
can see,
So, deep in my soul, the still prayer of devotion,
Unheard by the world, rises silent to thee,
My God, silent to thee,—
Pure, warm, silent to thee.

As still to the star of its worship, though clouded,
The needle points faithfully o'er the dim sea,
So dark when I roam, in this wintry world shrouded,
The hope of my spirit turns trembling to thee,
My God, trembling to thee,—
Pure, warm, trembling to thee.

LIKE a blind spinner in the sun
I tread my days;
I know that all the threads will run
Appointed ways;
I know each day will bring its task,
And, being blind, no more I ask.
HELEN HUNT JACKSON.

THE LORELEI

"The Lorelei" was written by the German poet, Heine. The Lorelei was a siren maiden who with her singing beguiled poor sailors to their death on the rocks of the River Rhine.

I KNOW not what sorrow is o'er me,
What spell is upon my heart;
But a tale of old times is before me—
A legend that will not depart.

Night falls as I linger, dreaming,
And calmly flows the Rhine;
The peaks of the mountains gleaming
In the golden sunset shine.

A wondrous lovely maiden
Sits high in glory there;
Her robe with gems is laden,
And she combs out her golden hair.

And she spreads out the golden treasure,
Still singing in harmony;
And the song has a mystical measure,
And a wonderful melody.

The boatman, when once she has bound
him,
Is lost in a wild sad love:
He sees not the black rocks around him,
He sees but the beauty above.

I believe that the billows springing
The boat and the boatman drown;
And that this, with her magical singing,
The Lorelei has done.

AFAR IN THE DESERT

This poem was written by Thomas Pringle, a Scotchman who went to live in South Africa. In these verses he gives us the Call of the Wild as only one who knows can give it.

AFAR in the desert I love to ride,
With the silent Bushboy alone by my side,
When the wild turmoil of this wearisome life,
With its scenes of oppression, corruption, and strife—
The proud man's frown, and the base man's fear,
The scorner's laugh, and the sufferer's tear,
And malice, and meanness, and falsehood, and folly
Dispose me to musing and dark melancholy;
When my bosom is full, and my thoughts are high,
And my soul is sick with the bondman's sigh,—
Oh, then there is freedom, and joy, and pride,
Afar in the desert alone to ride!
There is rapture to vault on the champing steed,
And to bound away with eagle's speed,
With the death-fraught firelock in my hand,—
The only law of the Desert Land!

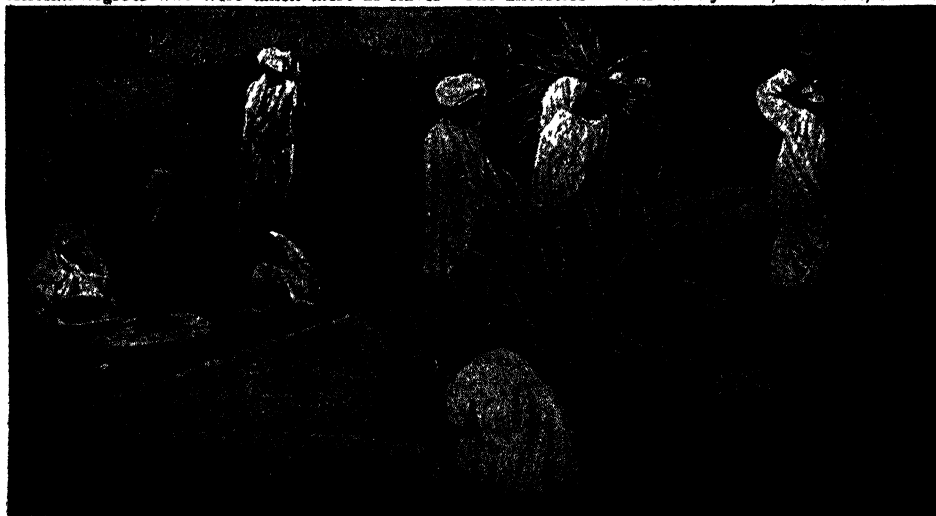
Afar in the desert I love to ride,
With the silent Bushboy alone by my side,
Away, away, in the wilderness vast
Where the white man's foot hath never passed,
And the quivered Coranna or Bechuan
Hath rarely crossed with his roving clan,—
A region of emptiness, howling and drear,
Which man hath abandoned from famine and fear.

Where grass, nor herb, nor shrub takes root,
Save poisonous thorns that pierce the foot;
Where sedgy pool, nor bubbling fount,
Nor tree, nor cloud, nor misty mount,
Appears, to refresh the aching eye;
But the barren earth and the burning sky,
And the blank horizon, round and round,
Spread,—void of living sight or sound.
And here, while the night winds round me sigh
And the stars burn bright in the midnight sky
As I sit apart by the desert stone,
Like Elijah at Horeb's cave, alone,
"A still small voice" comes through the wild
(Like a father consoling his fretful child),
Which banishes bitterness, wrath, and fear,
Saying,—Man is distant, but God is near!

COLORED PEOPLE, EAST AND WEST



When Columbus landed in what he called the West Indies, the people he found there were the Caribs, but these people have nearly all died out now. The West Indies to-day are largely peopled by descendants of the African negroes who were taken there as slaves. The ancestors of this family were, no doubt, slaves.



Further India is made up of what was once the Burmese Empire and part of the Malay Peninsula. The people, like millions of other Asiatics, live chiefly on rice, which they prepare by threshing the stalks.

Upper photograph, copyright by B. L. Slagley.

The Book of ALL COUNTRIES

WHAT THIS STORY TELLS US

WE have read the stories of India, of the British dominions on the continents of Africa, North America, and Australia; and of the smaller colonies on those continents, as well as the big islands which lie close to them. But there is still a great deal more of this wonderful empire of theirs. There is a big territory in Asia, east of India, sometimes called Further India; and the large island of Ceylon, at the southern tip of India itself. Besides this, we have all been told that "Britannia rules the waves!" and that means that there are far more British ships and British sailors on every part of the ocean than any other nation can show; and there are also an immense number of islands, scattered all over the ocean, big and little, fruitful and barren, which have become little bits of the British Empire; and here and there are little spots—on the coast of Spain, and in Arabia, and in China—where the British flag flies. We read of these places here, completing our story of the British Empire.

OUTPOSTS OF THE BRITISH EMPIRE

SOME of these places are real colonies, where British people have made homes, or live in order to carry on trade. Others are kept because Great Britain feels she must have fortified harbors of her own all over the world to which her fleets may repair, and ports from which they can get the stores they require when they need to remain a long time at sea.

Now, there is no sheet of water where it is more important to keep a strong fleet than the Mediterranean Sea. England found that out when Oliver Cromwell was Protector, and Robert Blake was his great admiral. At that time she had no port on the continent of Europe. Calais had been lost a hundred years before, and it was not till Cromwell had been dead for nearly fifty years that Admiral Rooke captured the Rock of Gibraltar from Spain. It was taken in 1704, and since then has remained in British hands. It is a strongly fortified port, and able to hold the Mediterranean open to the British fleet.

It is only a little bit of barren rock thrusting itself out into the sea, but it is of priceless value for all that. Once for three long years the French and the Spaniards besieged it, just at the time when England was fighting our ancestors in America; but the garrison held out grimly, and when the war ended the British flag was still flying over the Rock, and flies

CONTINUED FROM 1786



there to this day. There are two islands in the Mediterranean which must come into this story. One of them belongs to Great Britain, while the other belonged to Turkey until the outbreak of the Great European War. The first of these is Malta.

Hundreds of years before England began to have a history, this island of Malta was used by the great trading nations of the countries around, and they have left their images, pottery, and tombs to mark their presence. About the time that the Romans began to conquer Britain, in the first century after Christ, St. Paul was shipwrecked on the island. Later came dark times of pirates and Arabs, who were driven out about the times when the Normans had conquered England and were making the Domesday Book to show who owned the land. The people of Malta speak a language derived from the ancient Phœnician tongue.

The name of the chief town of Malta, Valetta, recalls a hero, one of the Knights of St. John, a brotherhood which had banded together to defend the sacred city of Jerusalem, and to resist the Turks in every possible way. These knights did much for the island, making fine fortifications and bringing shiploads of earth from Sicily, the better to grow food on this sun-smitten, rocky island. It was in 1565 that Valette, the Grand Master of the knights,

defended the island with great courage against the Turks, and the new city that arose on the ruins of the old one was called after him.

Over two centuries later the island fell into the hands of Napoleon, and later Nelson blockaded it. In the end it passed to the British, who greatly desired the island for its fine harbor, and for its value as a storehouse and a headquarters for the Mediterranean Fleet. Like Gibraltar, Malta has become doubly valuable since the opening of the Suez Canal.

BRITISH WATCH-TOWERS AND FORTS IN THE MEDITERRANEAN AND THE RED SEA

The second island in the Mediterranean is Cyprus. Great Britain paid Turkey a sort of rent for it, and attended to the trade and the management of the island, finding it useful as a watch-tower from which to observe what was going on at that far end of the Mediterranean near the Suez Canal. In 1914, when Turkey entered the war, Great Britain annexed the island.

When you have passed through the canal and sailed down the Red Sea, you come to another spot marked red. This is Aden, a strongly fortified harbor and coaling station in Arabia, which guards the mouth of the Red Sea, as Gibraltar guards the mouth of the Mediterranean. Here are batteries of heavy guns placed on the hard, dry rocks surrounding the town, which is a centre for trade in coffee, feathers, hides, and skins. Perim, a bare little island at the entrance of the Red Sea, is a coaling station; and Socotra is a larger island in the Indian Ocean, with mountains of granite and a bare soil. Arabs live on the island of Socotra, and it is valuable only because of its position on the most important road to India.

LONELY ISLAND PEAKS RISING FROM THE BED OF THE OCEANS

Far down the Indian Ocean is the island of the Mauritius, which used to belong to France; but the French ships there were so troublesome that the islands were seized during the war with Napoleon. This is another of the places which is kept chiefly for protection in time of war.

Two lonely mountain peaks, 800 miles apart, once active volcanoes, rise from the bed of the Atlantic, away

on the western side of Africa, and form the islands of Ascension and St. Helena. During the years when the British and Dutch were busy trying to sweep each other off the seas, the British managed to capture St. Helena, which contains only 47 square miles. One of its chief points of interest is that, when the great Napoleon was defeated at Waterloo, he was taken to this lonely island and kept there in exile till he died, so that he should not again upset the peace of Europe.

Ascension Island, about two-thirds the size of St. Helena, was taken after Waterloo, and is often spoken of as a fixed store ship. Little grows on the island, and sea-turtles are the only article of trade. These islands are outposts, convenient for the ships which have to remain for a long time on the high seas.

These two islands are in what you may call the African part of the Atlantic Ocean—they are nearer to Africa than to America. But most of the islands in the Atlantic are nearer to America.

THE CHAIN OF FAIRY-LIKE ISLANDS WHERE COLUMBUS IS SUPPOSED TO HAVE LANDED

Look well at the great semi-circle of islands that stretch from Florida in North America to the mouths of the Orinoco River in South America. They are the highest parts of a mountain chain whose lowest slopes are at the bottom of the deep, deep sea. The smaller islands are often only the very tops of the submarine mountains, but the larger islands rise high enough above the sea to have mountains upon them much higher than any mountains in the United Kingdom. Quite a number of these belong to the British Empire.

This curious ridge of islands reminds us of the way in which the islands lie grouped to the east of Australia, also in or near the Tropics, the hottest belt of the earth. Here, also, in the warm seas of the West, we find the same little builders without hands, forming coral barriers and reefs and countless beautiful fairy-like islands, very little raised above the surface of the crystal-clear sea.

It was on one of these coral islands, in the group called the Bahamas, that Columbus is supposed to have first landed. This is how he wrote of them: "It seemed to me that I could never

leave so enchanting a spot, and as if a thousand tongues would fail to describe it."

Travelers of to-day agree with him. Many invalids go from the United States and elsewhere to enjoy the beauty of these islands and their healthful winter climate. They never tire of the lovely walks in the flower-covered woods, or of boating in the clear waters of the beautiful bays. Oranges, bananas, pines, all grow in this chain of 500 islands, which stretches for nearly 800 miles. Only twenty of the islands have people living on them.

THE ISLANDS COLUMBUS MISTOOK FOR INDIA, AND CALLED THE WEST INDIES

The Bahamas, of which the British took possession a long time ago, look on the map as if they were a sort of fringe to the row of big islands which lie next to the south of them—Cuba, which is like a cigar (and a great many cigars come from it); and Haiti, which is sometimes called San Domingo, and sometimes Hispaniola, which means Little Spain; and Porto Rico. These are not part of the empire; but close to them there is a fourth big island, Jamaica, which is British. To the east there is a long string of smaller islands, stretching all the way from Porto Rico to the coast of South America, nearly all of which belong now either to France or to Great Britain. The whole of the sea which is girdled by all these islands is called the Caribbean Sea; and all the islands together are spoken of as the West India Islands, or the West Indies.

These names were given because the first Europeans who set foot on those lands were the sailors of Christopher Columbus. Now, when Columbus sailed across the Atlantic, what he expected to reach was not a new continent, but India; and so he, and the adventurers who followed after him, called all the native tribes of this new world "Indians," both in South America and in North America.

THE LAST STAND OF THE CARIBS

The tribes who were found in the islands were the Caribs and Arawaks. The Arawaks were gentle and peaceful; but the Caribs were a fierce and warlike race, some of whom killed and ate prisoners whom they took in battle. We get our word "cannibal" from their name.

The fate of these islanders was very

hard. Many were killed in wars with the newcomers. Many perished when compelled to toil in the mines on the mainland—a task for which they were quite unfitted. There is a thrilling story told about a last stand made by some of the Caribs in Grenada, one of the Lesser Antilles. The fight was on the top of a high cliff, and when further resistance was useless, one after the other they leaped from it into the sea far below. There are few natives left in the islands now, though there are many Caribs on the mainland.

If we look at the west end of the Caribbean Sea, we find on the mainland, at the beginning of the isthmus which joins North and South America, one red patch a little bigger than Jamaica. This is British Honduras. Eastwards, just to the south-east of the last of these islands, on South America itself, there is another red patch, which is British Guiana. Out in the Atlantic Ocean, nearly six hundred miles south-east of Cape Hatteras, lies a group of small islands which are also British. These are the Bermudas, where many people from the United States and Canada go to spend a winter vacation.

THE LARGEST ISLAND OF BRITISH WEST INDIES, AND SOME SMALLER ISLANDS

Jamaica, the "land of wood and water," in the tongue of the natives, is the largest of the islands belonging to Great Britain—not quite so large as Connecticut. There are at least thirty good harbors. Ships homeward bound from them bring in many West India products, especially sugar and bananas.

When the weather is too hot and damp round the coast, all Europeans who can do so go up to the beautiful country in the Blue Hills, where the air is fresh and the woods cool and shady.

A great many of the smaller islands in the curved chain between Porto Rico and Trinidad are volcanic peaks, with very fertile soil, in which grow many productions that need heat. The scenery is very picturesque with jagged peaks, beautiful woods, and in many cases fields like rich gardens. Limes, from which a refreshing drink is made, grow in Montserrat. St. Kitts and Nevis send sugar; Antigua sends over pineapples. There is a fine harbor in

St. Lucia, and another in Grenada, from which is sent much cocoa. Barbados, a little more than twice the size of Staten Island, has a large and industrious population and a healthy climate. There are good schools, and a university at Bridgetown, which is a real tropical "garden city."

THE BEAUTIFUL ISLAND OF TRINIDAD, WHICH SENDS ASPHALT FOR OUR ROADS

Trinidad, about the size of Delaware, is also a beautiful and fertile island. The great wonder of the island is its asphalt lake which astonished Sir Walter Raleigh when he landed there, and used the pitch to fill the seams of his ship. Quantities of the black sticky mass are brought to this country for use on our roads and streets. One of the great features of the West Indies is the numbers of points of communication that they have with the hot inside of the earth. Often there are serious earthquakes, and the old capital of Jamaica was overwhelmed by one not very many years ago.

As for volcanoes, perhaps there is no part of the world, except Java, where there are more gathered together than round the Caribbean Sea. Every now and then, through the centuries, one or another of these chimneys of the mighty furnace below bursts into active eruption. Quite lately this happened in the French island of Martinique.

WHAT HAPPENED IN TWO MINUTES ON THE ISLAND OF MARTINIQUE

At ten minutes to eight one morning a thick, dark cloud was noticed above the head of Mont Pelee. At eight minutes to eight the town clock of St. Pierre stopped. It had only taken two minutes for the black cloud to roll down the sides of the mountain, a vivid flash leaped from it, and in a moment flames burst out in every direction. The beautiful woods on Mont Pelee were left mere blackened stumps, and 32,000 people lay dead under the ruins and ashes of St. Pierre.

The Bermuda Islands are small in size, and produce chiefly vegetables, lilies, and arrowroot. Their great value is in their splendid harbors for shipping. In St. George there is a large dock for repairing ships which was built on the Tyne and towed across the Atlantic to the Bermuda dockyard. There is a cable

from Nova Scotia, which passes by Bermuda to Jamaica, and from there on to the West India islands.

British Honduras, about the size of Massachusetts, is the only British possession in Central America. It is noted chiefly for its forests, from which a great deal of mahogany is exported. Most of its people are negroes and Indians, and there are some descendants of the buccaneers.

British Guiana, nearly as large as Oregon, is the only British possession in South America. There is a low, swampy plain near the sea, producing chiefly sugar, the best kind of which is known as Demerara. The mountains behind are covered with forests. These mountains catch the winds laden with moisture, and the very heavy rainfall gives magnificent full rivers, which dash over the tremendous cliffs, one of them over 800 feet high.

THE STORY OF THESE ISLANDS BEFORE THE LANDING OF COLUMBUS

Now, of all these places history has nothing to tell us before the time when Christopher Columbus saw the Bahamas and landed on San Domingo; and then, if any people inhabited the islands, they were the Arawaks and Caribs. For many a year after that none but Spaniards tried to settle there, for they claimed that all the New World belonged to them. But if on any of the islands the Spaniards saw hope of getting wealth with little labor, they settled there, and the natives for the most part were slain or carried off to be slaves, and so died out, and the labor was done for the Spaniards chiefly by negro slaves from Africa.

For years, Spain held possession, but at last others began to dispute her claim. At first, the English made no settlement, though English seamen went out and fought the Spaniards, and seized their treasure-ships. It was not until about 1609 that the English took possession of the Bermudas, which until then were uninhabited. These are the islands which it is supposed Shakespeare meant when he wrote in the "Tempest" of "the still vexed Bermoothes." Just before that time England had seized Barbados, and after 1625, many planters settled there. The work of the plantations was chiefly done by negroes, but thousands of people who had been

OUTPOSTS OF THE BRITISH EMPIRE

convicted of crimes or offences in Great Britain were sent out as bondsmen; some for life, and some for a term of years. Jamaica was taken when Cromwell was at war with Spain. And in the eighteenth century, when Great Britain was at war with France, and sometimes with Spain, too, many islands were captured and recaptured by one or the other. In the end many of the French islands, and some that were Spanish, like Trinidad, fell to the British because their navy was the stronger. But because Spaniards and French and British all alike employed so much slave labor in those tropical lands, the most part of the population to this day is made up of the descendants of negro slaves and of half-castes.

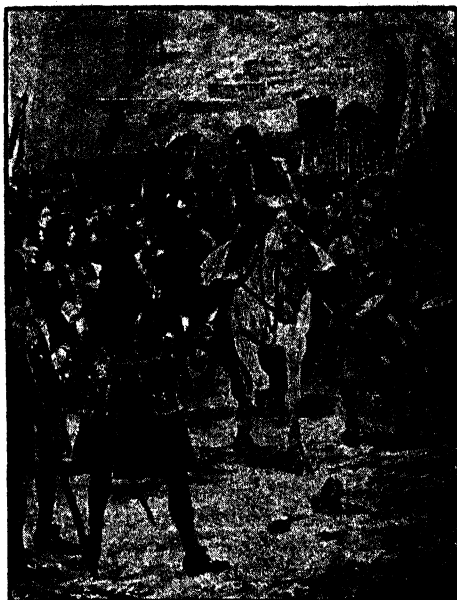
In the Pacific Ocean, too, there are many lovely islands, and some that are not lovely, which the British have settled at some time since Captain Cook made those voyages about a century and a half ago, of which we have read.



The surrender of the island of Malta to the British troops in the last year of the eighteenth century.

Here, too, the natives are dark skinned, and still not far from being savages, as Captain Cook found them. And then we come to Australia, and to the Malay Archipelago, where the Dutch were the first settlers. When the trade of the Indian seas was opened, a little more than three hundred years ago,

the British sought the Indian trade, while the Dutch took to what were called the Spice Islands, because of the spices which grow there. But because the trade in those regions is valuable, England



The Spanish officers and soldiers leaving Gibraltar after its capture by the British and Dutch fleet.

bought some lands from native rulers, and obtained others, such as Malacca and Singapore, from the Dutch by exchange.

On the north of China there is a spot called Wei-hai-wei, which the Chinese have leased to Great Britain for as long as Japan shall hold Port Arthur. China has some rights of government in this territory. And on the south coast of China is the little island of Hong Kong, which England got from the Chinese in the early part of last century for a port, partly for the sake of trade with China, and partly for her warships, and here the people are Chinese.

Hong Kong has prospered so greatly since it became a British possession that now there are nearly thirty-five times as many inhabitants as there were when it was Chinese. The Chinese Government wanted to prevent foreigners from trading, and would not protect them; but they promised to let their own people come to Hong Kong to buy and sell, and so merchants from all parts of the world come there to

trade with the Chinese. That is how the place has grown so greatly.

THE BRITISH DOMINIONS OF FURTHER INDIA AND CEYLON

Last of all, we come to the British dominions which are outside of India, but still are very closely connected with it—Ceylon, the big island, and what is called Further India. The government of Ceylon is separate from that of India. The island belonged to the Dutch for 140 years, but when in 1796 Holland had to take sides with Napoleon, Great Britain took it away from them and kept possession. The natives are closely related to the races who lived in India before the Aryans came there; and most of them are of the Buddhist religion, which had its origin in India, but afterwards almost disappeared from that country, though it spread beyond the Indian borders all over the east of Asia. At one time Ceylon produced a great deal of fine coffee, but its place has been taken by a good quality of tea. Large numbers of cocoa-nuts are grown, and the rubber plantations of Ceylon have of late years become famous. Ceylon has a great harbor called Colombo.

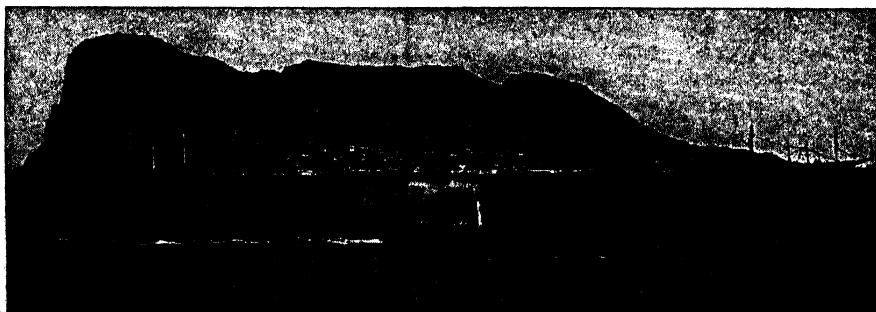
Further India is made up of the different parts of what was once the empire of Burma and part of the Malay Peninsula. The peoples are made up of a mixture of the yellow-skinned Malays, who are often called Lascars, and Singalese, like the people of Ceylon, and others who are more nearly related to the Chinese, with round, brown, flat faces and black hair. Most of the Burmese are Buddhists, and the country is covered with those queer-shaped temples which are called pagodas. The Burmese emperor used to be called the Lord of the White Elephant, because of the white elephants which were, so to speak, sacred to him. About a hundred

years ago the emperor threatened to make war on the British in India, and became so troublesome that England made war on him, and took away some parts of his territory which lay on the coast. Just before the Indian Mutiny she made war on him again, and took more territory; and at last, in the time when Lord Dufferin was Viceroy of India, Theebaw, the King of Burmah, was so troublesome and governed so badly that Lord Dufferin thought there was nothing to do but to put an end to Theebaw's rule altogether and annex all Burma—that is, to bring it under British rule and treat it as a part of India. So that Burma is now a part of India.

THE AIM OF BRITISH RULE IN ALL PARTS OF THE WORLD

All the other places about which we have been reading are either military stations under a military governor or what are called Crown Colonies; that is, they do not govern themselves by means of Parliaments and Ministers chosen by the people, but have governors appointed over them. For self-government is only possible where there is a large enough white population to make sure that the natives would not get the upper hand in the Parliaments and use their power to destroy the British rule. But the great thing for the British to remember is that the aim of their rule should always be to maintain justice and order, and to help the peoples over whom they rule to be prosperous. And so long as this continues the British Empire will remain strong, but if ever they forget this and turn to oppressing the subject peoples for their own advantage, the British Empire will vanish away like the great empires of the ancient world.

THE NEXT STORY OF COUNTRIES IS ON PAGE 2067.



The Rock of Gibraltar, on which the British flag flies at the entrance to the Mediterranean Sea.



THERMOMETERS

HAVE you ever seen temperature expressed in Centigrade degrees and wondered how many degrees Fahrenheit that meant?

Thermometers, you know, are simply instruments for measuring temperature. Most of them are made of a glass tube containing clear mercury. When heat is applied to solids, liquids or gases they become larger; and when the heat is removed they become smaller again. If the glass and mercury both increased alike when a certain amount of heat is applied, then the liquid would not rise in the tube. But since mercury swells seven times as much as the glass does, the liquid expands and rises in the tube when it is warmed; and when cooled it contracts and sinks down again. It was found that pure ice will melt at a constant temperature and that water boils at a constant temperature, when the pressure is one atmosphere.

To find the freezing-point the tube is placed in melting ice, and the spot in the tube where the mercury becomes stationary is noted and a mark made in the stem at that point. The boiling-point is then found by putting the bulb and stem in the steam rising from boiling water, and the place at which the mercury stops is marked. The space between these two points, and the part below the freezing-point, are then divided up and marked.

FAHRENHEIT THERMOMETER.

There are several kinds of thermometers, as you may read on page 4395. The one we know best is called the Fahrenheit. This was made about two hundred years ago in Holland by a man named Gabriel Daniel Fahrenheit. Here the freezing-point is marked 32 and the boiling-point 212. He took the temperature of a mixture of ice and salt and marked it zero. You see it is possible to have water several degrees below the freezing-point without actually making ice. Fahrenheit found that as soon as ice began

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to form the temperature always rose to the same point and that a mixture of ice and snow with pure water always gave the same temperature. The top point in his scale indicates the boiling-point. Between the two fixed points, which are 32° and 212°, there is an interval of one hundred and eighty degrees. Fahrenheit's scale with its zero below the freezing-point is still used in the United States and England, and in other countries where English is spoken.

CENTIGRADE THERMOMETER.

Another thermometer, called the Centigrade, is used in many parts of Europe, and by scientists all over the world. It is very popular as it is easy to use. The Centigrade scale, as its name indicates, is divided into a hundred degrees. The word comes from the Latin, centum, a hundred, and gradus, a degree. In this thermometer the freezing-point is marked 0, and the boiling-point 100.

The difference between the freezing-point and the boiling-point of water is 100° on the Centigrade thermometer and 180° on the Fahrenheit scale. Therefore 5° Centigrade is equivalent to 9° Fahrenheit. So you see 1° Centigrade must equal 9-5 of 1° Fahrenheit. If a Fahrenheit thermometer reads 70°, the actual temperature is really 70 - 32, or 38° Fahrenheit above the freezing-point; but 38° Fahrenheit equals 9-5 of the corresponding Centigrade reading, which is 21 1-9° Centigrade.

So you see there is a very simple way to change a given number of degrees Fahrenheit into Centigrade, as follows: subtract 32 from the number, multiply the result by 5, and then divide by 9. For instance, if you know that the Fahrenheit thermometer reads 104°, and you wish to find how many degrees Centigrade is expressed, first subtract 32 from 104, which gives 72. Then multiply that result, 72, by 5, which gives 360, and divide by 9, which leaves 40°, which is the equivalent Centigrade reading.

To reverse the process and change degrees Centigrade into Fahrenheit, multiply by 9, divide by 5, and add 32. For example, how many degrees Fahrenheit is equivalent to 100° Centigrade? To find the answer, first multiply 100 by 9, which gives 900, divide by 5, which gives 180, and add 32 which gives 212°.

Each degree of the Centigrade scale equals 1.8° Fahrenheit, as the Centigrade zero is at the freezing-point, or 32° Fahrenheit. Five degrees Centigrade are equivalent to 9° Fahrenheit or 41° on the Fahrenheit thermometer, and the point marked 10° on the Centigrade scale corresponds to the point marked 50° on the Fahrenheit scale.

The rule which you follow in changing degrees of one thermometer to those of the other may be expressed in this way:

$$F = C \times 9 - 5 + 32 \text{ or} \\ C = 5 - 9 (F - 32).$$

REAUMUR.

The Reaumur thermometer is another kind which is different from both the Centigrade and Fahrenheit. It was made by a Frenchman in 1730 and is used in Spain and some parts of Germany. In Reaumur's thermometer, the space between the freezing-point and the boiling-point of water is divided into 80 equal parts, and zero is placed at the freezing-point. To change a certain number of degrees Fahrenheit into Reaumur, first subtract 32 from the number, then multiply the result by 4, and finally divide by 9. For instance, you may wish to change 104° Fahrenheit into Reaumur by this method. If so, first subtract 32 from 104, leaving 72, then multiply 72 by 4 and you will have 288. Divide this by 9 and you will have 32° Reaumur. So that 32° Reaumur is equal to 40° Centigrade and 104° Fahrenheit.

To change Reaumur into Fahrenheit, multiply by 9, divide by 4, and add 32. For example, to find what 80° Reaumur equals in the Fahrenheit scale, follow this method. First multiply 80 by 9, which gives 720, divide this by 4 which gives 180, and add 32 and you will have 212°. The formula which you use may be expressed in the following way:

$$F = R \times 9 - 4 + 32.$$

ALCOHOL THERMOMETER

As the mercury in the tube will freeze at about 40° below the zero point in the Fahrenheit thermometer, alcohol colored red, or even ether is used in the thermometers in very cold places. This kind of thermometer marks degrees as low as 100° below zero. The alcohol thermometer cannot be used for temperatures above its boiling-point, which is 80° Centigrade.

TEMPERATURE

The ideal room, or indoor temperature is about 68° to 70° Fahrenheit, with about 50 per cent. of humidity or moisture. If the temperature of the room drops toward 60° Fahrenheit, the probability is, we have already taken cold before we notice the change. If the temperature in an artificially heated room rises towards 76° or 78° Fahrenheit, the air we breathe is vitiated, contaminated and rendered unhealthful, and becomes a breeding-place for bacteria.

The normal temperature of the human body in health, is usually 98.6° Fahrenheit. In summer and winter, regardless of the changes of the surrounding atmospheric temperature, the temperature of healthy persons seldom varies more than one degree of temperature.

A GAME TO PLAY AT A PARTY

TWO captains, A and B, are chosen, who in turn select their teams. The players all gather around a long table, one team on one side with its captain at the head, the other team on the opposite side, headed by its captain. A quarter is the only thing necessary for the game.

A's side takes the coin first and passes it under the table from one hand to another, without being seen by the opponents. One member of the team takes the coin and conceals it in the palm of his hand in such a way that when the hands are placed on the table, the others cannot tell where it is.

The captain (B) of the opposing side then calls, "Jenkins says, Hands up!" when all the members of A's team must bring their hands up, with fingers tightly closed, and place their elbows on the table. B's team may then look over the hands and try to locate the coin which is hidden in one of the hands. After a few minutes of guessing, the captain then gives the order, "Jenkins says, Hands down!" when all hands must be slammed flat on the table, palms down-

ward. Each one tries to make as much noise as possible to hide the sound of the coin as it strikes the table.

The object of the game is for the opponents to guess under which hand the coin is hidden. B's side then consults as to where the coin is, judging by the look of the hands. The captain of the guessing side then orders the hands not holding the coin to be removed one at a time, specifying whether it is the right or left hand that is to be lifted.

If the guessing side is successful in eliminating all of the empty hands so that the coin is left under the last hand, then that team wins, and the coin is passed over to B for the next round. If a player obeys the orders of a member of the opposing team who is not the captain, his side forfeits a point. If the coin is disclosed before the last hand is reached, then the side holding it adds to its score the number of hands remaining on the table that were not ordered off. The side that scores the greatest number of points in a given time is winner.

A PICTURE-FRAME THAT A BOY CAN MAKE

IT is not a difficult matter to frame a picture, but the work requires care and accuracy. The wood of a picture-frame is called the picture-frame molding. This molding is sold in lengths of 6 feet, or longer.

If you look at the end of a piece of picture-frame molding, you will find that, whatever may be the shape of the ornamental surface which will be visible when the picture is framed, there is at the back of it what is called a *rebate*, but what we may describe as a sunken edge all along one side. When the picture is framed this sunken edge is put on the inside next the picture, so that it forms a regular depression all round in which the picture and the glass lie. Picture 1 shows a piece of molding cut at the ends to the shape required for making a frame, and illustrates the rebate.

In an ordinary picture-frame the molding is in four pieces, the top and bottom pieces being exactly alike in length, and the two sides being exactly alike in length. The ends of the different pieces are not cut square across, but are cut to an angle of 45 degrees. Although most people know what an angle of 45 degrees means, it may be well to explain it. The corner of a square is a right angle. If from one corner of a square to the opposite corner of the same square we draw a straight line, we divide the right angle into two equal parts, and each half is an angle of 45 degrees. Builders of Modeltown have had explained to them on page 481 how to make angles of different sizes, and by following the instructions given there it will be easy to draw an angle of 45 degrees when we wish to cut the picture molding into the necessary lengths. The carpenter who wishes to mark wood to an angle uses a bevel, such as is seen in picture 2.

A neat picture-frame depends upon the neatness of the mitres or corners, and the ends must be sawn

very exactly and put together very exactly. If the molding is a plain one with a surface that is flat or nearly flat, it may be quite possible to cut the corners to the proper angles; but if the molding has an irregular or ornamental surface, then this may not be possible without using an instrument which is called a mitre-block, such as is shown in picture 3.

A plain mitre-block consists of two pieces of wood nailed together, both of the same length, but the lower one a little wider than the upper one. The sizes are unimportant. Through the narrowest piece saw-cuts are made to guide the saw as shown in the picture. Two of these are at an angle of 45 degrees, sloping opposite ways. The middle one is square across, for square cutting. The molding rests on the lower part of the block, and is pressed against the edge of the upper narrower piece while it is being sawn. A mitre-block may be purchased at a tool-shop or one may be made. It should be made of hard wood, such as beech.

The sizes for the four pieces of molding are, of course, taken from the picture itself. The inside or rebate edge of the molding is about a quarter of an inch shorter than the side of the picture where it is to touch. This allows the extreme edge of the picture to go into the rebate. This length of the inside edge of a piece of molding is called the sight measurement, because upon this depends the size of the picture that will show within the frame.

The mitres when sawn are not accurate enough to fit each other as perfectly as is necessary for neat appearance, and therefore a plane should be used after a saw. To do this properly, another special appliance, called a mitre-shoot, is required. Picture 4 shows how it is

used. The plane is slid on its side, and the molding bears against a piece of wood put on at the angle of 45 degrees. This ensures the mitred ends being planed to the correct angle, and if the plane-iron is set carefully it will cut square in the vertical direction. Without a mitre-shoot it is quite possible to plane or pare the mitres accurately, but it is not easy, and there is risk of injury to

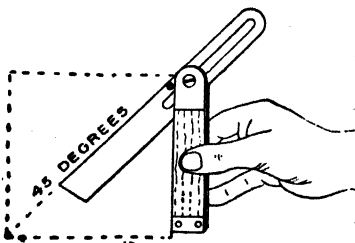
the edges of the molding. Plain molding that can be turned over on its face on the mitre-shoot may have both its ends

planed in the position shown in picture 4 on the next page, but generally it is necessary to turn the shoot round and work the plane with the left hand for one end. Mitre-cutting machines are very useful, but are regarded as too expensive for anyone who is not constantly framing pictures.

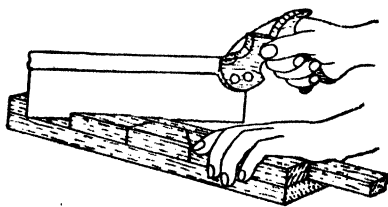
Frames are held together by glue and nails at their corners, and also by paper,



1. Picture-frame molding cut to shape



2. Using the bevel



3. Using the mitre-block

which is generally glued either round the edges or all over the back to keep out dust and strengthen the frame. After the mitres are cut, the four pieces should be placed in position, to be sure that all the corners fit properly. There are then two different ways in which the gluing and nailing may be done. Of course, if corner-cramps or an entire frame-cramp is to be used, that will simplify the work; but we will suppose the frame is to be put together without these appliances. The simplest, quickest, and roughest way is shown in picture 5. One piece of molding is gripped in a vice tightly enough to resist the force of hammering the nails into its end, and then the glue is applied and the next piece of molding held in position and nailed to it. The best vice for the purpose is an iron one, but a piece of wood or cardboard should always be put between the iron jaw and the outer edge of the molding in order not to injure the latter. On the inner edge the vice-jaw grips in the rebate where marks of the vice on the wood will not matter. Fine wire nails should be used, and holes bored for them with a bradawl through the first mitred piece, and slightly into the end grain of the second. As the hammering is likely to cause the first mitred piece to slip inward a little at the joint, the nailing should begin with the first piece too far out. A side and end of the frame are joined in this way, and then the other side and end similarly. After this the two remaining corners may be done without the vice, if preferred, but to avoid risk of injury to the joints already secured it is safest to continue with the vice.

The other way of putting a frame together is first to glue the parts and then cramp them together, leaving them for a few hours until the glue has set before putting in the nails. This is slow, and some means of cramping is necessary, but a neat result is more certain, for by the other method the parts are liable to shift out of exact position while the nails are being driven.

Without special cramps the simplest way to bind the frame together while the glue is setting is to make four blocks to fit the corners, and to tie string round the outside as shown in picture 6. A flat surface

is cleared to lay the frame on; glue is applied to all the mitres; they are quickly placed together with the blocks outside, and then the string is tied round as tightly as possible. Sometimes it is not tied very tightly at first, but means are provided for straining it after. The method of tightening shown in picture 6, however, is easy and satisfactory for

ordinary work of moderate size. A loop is formed at one end of the string, and the other end is pulled through this, so that it can be strained tightly simply by pulling. It is then necessary to secure the end of the string to prevent it from loosening again. This can be done

by winding it a few times round nails in one of the corner-blocks as shown.

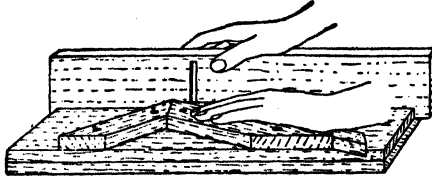
If glass is used it must fit easily into the rebate. The picture is placed face down on the glass, and generally a sheet of clean brown paper is placed on the back of the picture. Then the backboard, which is a thin piece of wood of the same size as the glass, is put in and secured by driving fine wire nails horizontally into the molding, leaving their heads standing out a little way, so that they keep the backboard pressed against the picture-back. Brown paper is generally pasted either over the joints only or over the entire backboard and frame.

Unmounted pictures—that is, pictures on thin paper not mounted on cardboard—are liable to become wrinkled, and will not lie evenly against the glass if they are put in dry. Therefore, the backs of such are always damped, and allowed a few minutes in which to stretch before the backboard is put in. This should press firmly on the picture, and as the latter dries it becomes strained and always remains quite flat.

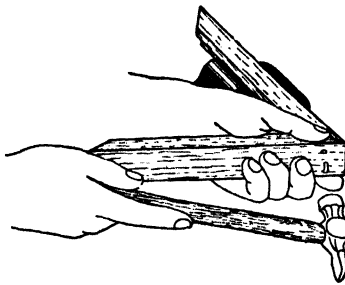
It is much easier to make a frame if metal corner-cramps are used. These hold the

corners more securely than the wood blocks in picture 6, and the nails can be driven without waiting for the glue to dry. By the method shown in picture 5 there is no waiting, but it is not easy to nail the frame together accurately in that way. A very useful appliance is a combined mitre-block and corner-cramp.

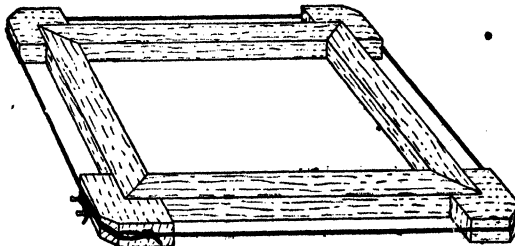
With this, and a fine saw, the corners can be fitted without the use of a plane or chisel. Professional picture-frame makers use a form of cramp which grips all four corners of the frame at once, and ensures its being square.



4. Using the mitre-shoot



5. Joining the corners



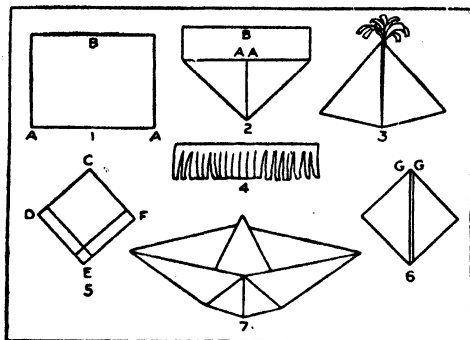
6. Binding the picture-frame

WHAT TO DO WITH A PIECE OF PAPER

A HAT, A BOAT, AND A PARACHUTE

HAVE you ever tried how many toys can be made out of a sheet of paper? With a little practice and skill we can convert a plain sheet of paper into any one of quite a number of delightful little toys. Shall we begin with the simplest of all, and learn to make a paper hat like that which you see in picture 3?

Take a sheet of paper—either plain or colored, or even newspaper will do—about nineteen inches long and fourteen inches wide; fold it in half to look like picture 1; turn up the corners A A until they meet below B as in picture 2; turn down the top pieces marked



How to fold the paper to make the hat shown in picture 3, the boat in picture 7, and parachute in picture 11

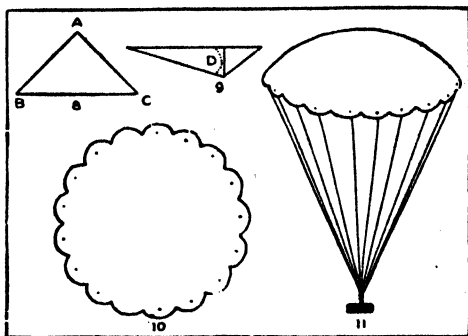
B, one on the one side of the triangle and the other on the other side. Arrange the corners that stick out neatly by tucking one inside the other, and the hat is complete.

To make a cockade for our hat, cut a strip of paper as shown in picture 4, fold it in three, and push it in between the folds as in picture 3.

A paper boat is built up from a paper hat. When the hat is complete, we hold each side of the triangle in the middle with the thumb and first finger of each hand, and carefully pull out until the figure becomes square (double, of course), as in picture 5. Turn up the corners E, one on the one side

and the other on the other side, to meet point C, so that we again form a triangle. Once more hold the sides of the triangle and pull out to form a square as in picture 6. Finally, hold corners G G with thumb and first finger of each hand and gently pull out right and left until the boat is complete, as in picture 7.

Another very simple toy to make is a paper parachute. Take a smooth, square piece of tissue-paper and fold it from corner to corner, making a triangle as in picture 8. Fold corner C to B; again fold in the same way from corner to corner and fold in half as in



picture 9. Take a pencil and mark curved line as shown by the dotted line in picture 9; then, with a pair of sharp scissors cut through all thicknesses of the paper round this line. Bore a hole at D with a stileto; open out the paper, when it will look like picture 10.

We must now get sixteen threads of cotton of equal length; fasten one through each hole in the paper, bringing the loose ends together below. Fasten these together and attach a small piece of cardboard or stiff folded paper as ballast. Our parachute is now complete, and if taken out of doors on a windy day it will sail up a considerable height.

HOW TO MAKE A LAVENDER BOTTLE

IF you want to make a lavender bottle you must buy a bunch of the sweet-smelling lavender—that is, if you are not fortunate enough to have a bush of it in your garden.

Cut off the heads of the lavender sticks and place them in a small piece of cotton-wool about four inches long. Roll

up the cotton-wool, and tie it tightly round with a piece of cotton, keeping the top and bottom tighter than the centre. This is the foundation of the bottle. Then take an uneven number of the lavender sticks, 9, 11, or 13, and cut them to exactly the same length. Place the ends of the sticks round the rolled-up piece of cotton-wool, about half an inch down, and tie them very firmly round with cotton. Then bend the long ends which are left back over the



whole length of the cotton-wool, and tie them firmly at the end of this, keeping them about the same distance apart round the centre. Next you must take a piece of "baby" ribbon of any pretty color, about two yards long, and, with the help of a bodkin, thread it in and out the sticks—under one and over the next, round and round from top to bottom until the whole of the cotton-wool is completely covered. Be very careful not to get the ribbon twisted or the effect will be spoilt. Finish off the ribbon firmly at each end with a needle and cotton, and cover it with a little ribbon bow of the same color. Tie a piece of ribbon round the ends of the sticks, about a couple of inches from the bottom, and your lavender bottle is finished.

THE WANDERING COIN

WE can make a box which has the power to make a silver quarter of a dollar placed within it disappear at command, coming back when we desire that it shall do so.

To start with, we must get a pill-box of wood or cardboard, as seen in picture 1, and of such size that a quarter lying flat inside it will exactly cover the bottom. If the box is of cardboard it will serve as it is, but if it is of wood we must line it inside at the bottom with paper, pasted down smoothly. For the sake of uniformity, it is as well to line the inside of the lid in the same way. We must then take a quarter, and cover one side of it with the same sort of paper, trimming it nicely round the edges. The coin thus treated will on one side look like an ordinary quarter, but on the other like a mere round of paper or cardboard.

To show the trick, we borrow a quarter. After it has been handed to us, we say that someone may like to see the box, and we hand it round for inspection. While the general attention is thus occupied, we secretly exchange the borrowed coin for the prepared one. This we must have concealed beforehand in the right hand, held, by bending the fingers slightly, against the lower joints of the second and third fingers. We lay the prepared coin, papered side downwards, on the table, where all can see it. The borrowed quarter we deposit secretly somewhere just out of sight, but where we can instantly get at it again when we want it—say, behind a book or other object that lies handy. It is surprising how small an object will serve to screen a coin, provided that the table is between ourselves and the company, as it should be when we are conjuring.

Having got so far, we take the open box in the left hand, and the prepared quarter between the forefinger and thumb of the right, taking great care to keep the uncovered side towards the company assembled in front of us, and place it in the box, but in doing so we tilt it so that this side shall fall forward. It will therefore lie with the papered side uppermost. We now close the box, and shake it up and down several times, which makes the coin rattle, and proves that it is still there. "Quarter, go!" we then command, and shake the box again, this time from side to side, in which direction the coin has no room to move, as it fits the box and so cannot rattle. "It is gone!" we say, and, opening the box, we allow anyone to look into it. Seeing the paper

side of the coin, they take this to be the bottom of the box.

"Now," we say, "I will bring the quarter back again." We close the box, saying, "Come!" Again we shake it, this time up and down. The coin is once more heard

to rattle, having apparently returned from its wanderings. "It has come back, you see!" We open the box, and turn the quarter quickly out into our hand, into which it will fall with the papered side downwards. All present take it for granted that it is the borrowed quarter, for which we must again exchange it, gaining opportunity to do so by once more inviting the spectators to examine the box, which, as you know, can tell no tales.

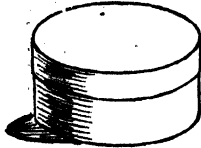
This is a very good trick as it stands; but we can produce a still greater effect with it by apparently conjuring away the quarter from the box altogether, and reproducing it somewhere else. One very good way is to produce the real borrowed quarter, marked so as to prove that it is the same, from the very middle of a ball of wool. For this purpose we will need another little piece of apparatus, which again

we can manufacture for ourselves. To do so, we take a piece of tin 3 inches long by $2\frac{1}{2}$ inches wide, and fold down its longer edges so as to form a sort of flat tube, just large enough to let a quarter slip easily through it. The edges will be a little apart, as in picture 2. On one end of this tube we must wind

Berlin wool so as to form a ball, the opposite end of the tube sticking out an inch or so, as in picture 3. The wool should be of the heavy kind that ladies make antimacassars of, and wound lightly. This ball, which should be about 3 inches in diameter, we put in one of our side-pockets, or, if we find it more convenient, we may have it in a bag on the table or in a drawer behind it.

Now for its use in the trick. When we have borrowed and exchanged the quarter as already described, and the box has been examined, we say, "Now I should like you also to see whether you find anything

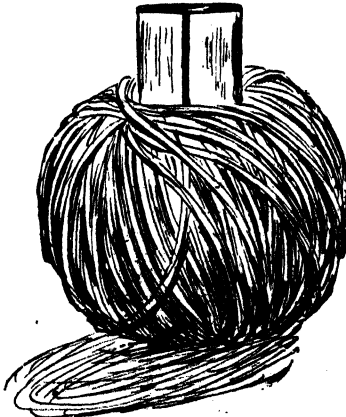
suspicious about this ball of wool." As we say this, we put the right hand, containing the borrowed quarter, into the pocket or the bag or drawer in which we have concealed the ball, drop the quarter down the tube, and draw out the tube. It will need a little practice to do this with one hand; but if we have taken care to wind the wool lightly we will



1. The coin box



2. The tin tube



3. The ball of wool with tube

soon be able to manage it. As we take out the ball, we squeeze it to close up the opening left by the tube. The ball now may be freely handled, for the coin cannot escape till the wool is again fully unwound from the middle.

When we work the trick in this way, instead of making the quarter reappear in the box, we order it to pass into the ball of wool, which we then hand to someone to wind off, say, round a book or card.

AN EASY WAY TO MEASURE THE HEIGHT OF A TREE

THERE is a very easy way to measure the height of a wall, or a tree, or a church spire, that any boy or girl can use if he or she can do a sum in simple proportion. It is necessary that the sun should be shining at the time—that is all. Suppose that we have a tree, and the sun is shining, then the shadow of the tree is cast on the ground. We must measure the distance from the extreme point

of the shadow to the place right under the top of the tree. If the top point of the tree is right above the middle of the trunk, then we must calculate half the diameter of the trunk in making our measurements. Suppose that the distance from the point of the shadow to the trunk of the tree is 40 feet, and

that the tree is 2 feet thick, then the total distance is 41 feet (40 feet plus half the diameter of the tree). Now we take a stick, of which we know the exact length. Suppose that it is 3 feet long. We hold this upright with one end on the ground and notice how far its shadow extends. Then we measure the length of the stick's shadow, and perhaps



The height of a tree shown by its shadow

find that it is 6 feet long. Now we multiply the length of the tree's shadow (41 feet) by the length of the stick (3 feet), and divide by the length of the stick's shadow (6 feet). The answer we get is $20\frac{1}{2}$, and we know that the tree is $20\frac{1}{2}$ feet high.

If we get odd inches in our measurements, we can work the sum out in inches instead of in feet. We can also get the answer—though

not quite so correctly—by seeing how many steps it takes to go from the edge of the shadow to the tree, being careful to make our steps as nearly uniform as we can. Then, by measuring the length of one step, we can multiply its length by the number of steps, and find the distance. But in any measure-

ment, whether it be a tree, or a church, or a wall, we must make sure that we take the distance to a point immediately under the highest point, so that if it be a church spire, for instance, we must make allowance for the distance between the wall up to which we measure and the centre of the church tower.

WHAT TO DO IN A THUNDERSTORM

THERE are some people who, when they hear the roll of thunder, are terribly alarmed, and run to hide themselves in a dark cupboard or cellar. These people are often laughed at for their fear, and, as a matter of fact, there is not the slightest danger to be feared from thunder, which is simply the report and echo of the electric spark caused by a discharge of electricity between two clouds, or between a cloud and the earth. But, on the other hand, we should be on our guard against lightning, for there may be danger from the flash.

It is always useful to know what to do in a thunderstorm. First of all, if we are indoors, the best thing to do is to keep away from those things that are good at conducting electricity, and might conduct it to us. Heated air, smoke, and soot are good conductors, and so also are metal grates, fenders, and fire-

irons. Therefore, we should not stand near the fireplace. It is wise also to keep away from the window, because of its iron bolts and fastenings. Mirrors are good conductors, because of the quicksilver on their backs. The safest part of a room during a thunderstorm is the middle, and it is always good to stand on a thick hearthrug if the lightning is very powerful, as a dry rug, being a bad conductor of electricity, would insulate our body—that is, prevent the electricity passing to it.

If we are out walking, it is foolish to go and take shelter under a tree; in fact, it is unwise in a thunderstorm to stand near any tall object, which is a poor conductor of electricity.

It is not dangerous to stand near a lightning conductor, as some people think, for the electricity would pass down the metal in preference to anything else.

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO IN THE MIDDLE OF NOVEMBER

THERE is some delightful gardening work that may be reserved for this late season of the year. Already in this part of our book we have spoken of the pleasure of growing Alpines, or mountain plants. There is a wonderful charm in making a fitting home for these little plants that love the high ground and the cold of the bitter Arctic regions, where for months they lie buried under the snow, and then, as soon as it has left them uncovered, make rapid growth and burst into masses of flowers.

Of course, we understand that in the far northern Arctic regions, and also on the bleak mountain-sides, the winds and weather are sometimes terrific. That is a point to notice, and as a result of it, through long, long ages, it will be found that for the most part these plants are very dwarf, so that the winds cannot break and destroy them. Many of them are beautiful creeping things that lie along the soil and grip it tight with sturdy and numerous roots, for only thus could they exist. Therefore, when we make our rock garden, or garden of Alpines, we shall expect masses of dwarf plants that make dense patches of bright and beautiful color.

Another point to consider before we come to the practical making of our rock garden is to realize that plants that love to grow on the steep sides of a mountain will be plants that like good drainage of moisture from them, and certainly should not be asked to grow in low, moist, water-logged spots. You can understand that if you stand and water a hillock some of the water runs away down the sides. Now, though we must not have drainage as sharp as that, or our plants will be burnt up in summer, yet we should try to raise the position somewhat above the level, and we may use pieces of stone or clinker to help us to make a fitting home for the plants. The stone or clinker is useful in many ways—it helps to make a beautiful sitting for our plants; it helps to keep the soil cool and moist for them in summer, as they get their roots well under it where it is cool and comfortable; and not least is it useful for those plants that like to cling to the stone and gradually creep and cover it.

And now, with these words to introduce so interesting a subject as the making of a little bit of rock garden, we will consider a few important practical matters.

We will suppose you wish to devote a third portion of your little plot to this purpose, and unless it be very small it is always picturesque to have a pathway running through the rock garden, so that you have your plants growing on both sides of you as you walk along. If

you like, the pathway can be dug out, and this may have very decided advantages, because the soil you thus throw up, as long as it is good enough, will help to give you a raised slope on either side of your pathway. You need not dig it all to the same depth, so that, if you wish it, you could make a step or two; these are always pretty additions.

Alpine plants, although so dwarf above the soil, often have curiously deep rooting habits, so that you will see this additional soil is useful in giving them depth of root-run. When it comes to putting the stone or clinker into place, you must bear in mind that it must not merely be laid on the surface, but embedded in the soil for a few inches. Just as far as possible you want to make the rock—that is to say, the stone, or, if that is not to be obtained, the clinker, which is much cheaper—appear as if it were really in masses under the soil, showing through here and there, to give it quite a natural look.

When you place your stone or other material, always begin at the bottom of your slope, and work upwards. Never make too steep a face to the slope; throw it back in ledges, as, though the plants do not like cold, wet positions for winter, they require plenty of water during the summer months, and if the face of the slope be too steep very little reaches them as it runs off, as we have already seen.

You need not wholly finish the making of your rock garden before you begin planting. Often it is more convenient to plant as you go along. Especially is this the case with plants that you want

to establish between two stones placed fairly close together. You should take a stick and ram the soil quite firmly around plants that are to be planted in these fissures, as they are called, because the soil settles down, and if it is not around the roots in ample quantity, of course, the roots are left bare in this settling process, and when a dry time comes the plant will die.

These may seem unimportant matters, but it is in the little things that success is to be obtained. No detail is too small to heed.

There are a few questions we do well to ask ourselves at the time we are establishing our plants: Am I giving this plant a position in which it has a sufficient depth of earth to root in? Am I placing it so that nothing overhangs, and it is able to benefit by the refreshing showers of rain? For of course it is most important to know that the moisture does not run off through some opening between the stones. Another point to remember is never to work at the making of a rock garden when the soil is so wet that it sticks together in lumps and hangs to the tools.



An autumn rock garden

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 2031.

The Book of SCHOOL LESSONS

WHAT OUR LESSONS TEACH US

HERE, in the Reading lesson, we learn something about the meaning of words. The Writing lesson teaches us how to join letters together to make words. In the Arithmetic lesson this time we are shown how to add large numbers together. In the Music lesson we must bear in mind that the word Semibreve means whole-note; Minim means half-note; Crotchet means quarter-note; and Quaver means eighth-note. The Drawing lesson teaches us to draw with both hands, and in the Picture-Stories in French we read how the party spend their first morning in Paris.

CONTINUED FROM 1732

READING

THE MEANING OF WORDS

DO you know what a Dictionary is? If you do, and if you have ever looked inside one, I expect you will have thought it a very dry book, and soon put it down. But a Dictionary really is a very interesting book. For it tells us all about the meaning of words, and how they came to mean what they do.

Have you ever wondered why one word means one thing, and another word means something quite different? Isn't it funny that BREAD never means CHEESE? Why doesn't it? Why was bread called bread, and cheese called cheese? Well, the Dictionary tells us all this, and a great deal more besides.

Now let us make a little Dic-tion-ary of our own, to help us in our reading lesson. Here it is with pictures:

All these words come in the Twenty-third Psalm, and many of you, I expect, have learnt it off by heart. Remember that it was written by David, who was a shepherd before he became king. So he knew what he was writing about. King David wrote as if he were a sheep, and God was the shepherd leading him. Shall we try part of it?

The Lord is my SHEPHERD: I shall not want.

He maketh me to lie down in green PASTURES.

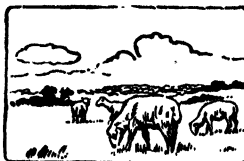
He leadeth me beside the STILL WATERS.

He restoreth my soul. He guideth me in the PATHS of righteousness for His name's sake.

SHEP-HERD—
A man who takes care of sheep.



PAS-TURES—
Green fields where sheep can feed.



STILL WA-TERS —
A quiet stream, flowing very gently.



PATH—A way across fields, made by many people or animals walking on it.



ROD—A long stick.



STAFF — A shepherd's crook.



VAL - LEY —
Land lying between hills or mountains on both sides.



Yea, though I walk through the VALLEY of the shadow of death, I will fear no evil; for Thou art with me.

Thy ROD and Thy STAFF, they comfort me.

As we have been talking about a shepherd and sheep, it will be nice to read some words that Jesus said about sheep, too :

"I am the Good SHEPHERD: the good SHEPHERD layeth down his life for the SHEEP. He that is a hire-

ling, and not a SHEPHERD, whose own the SHEEP are not, beholdeth the WOLF coming, and leaveth the SHEEP and fleeth, and the WOLF snatcheth them and scattereth them. I am the Good SHEPHERD, and I lay down my life for the SHEEP."

By this time I am sure you will have learnt the words shepherd and sheep, and will know them whenever you come across them in a book. So that we are now getting on to quite long words, and in our next lesson we will learn some more.

WRITING

LEARNING TO WRITE LITTLE WORDS

"NOW that we have written all the small letters, we must see that we have not forgotten any one of them, so first it will be a good plan to write each of them once," said Tom's mother.

Of course, they both knew the alphabet, so this time they wrote the letters in order—a, b, c, and so on. Their mother was quite pleased with the way they wrote them.

"That is good," she said. "Now we are going to put the letters together to make words, for the letters in a word join on to one another, just as we join hands when we play some of our games.

"Here are some small words. You know all the letters, but watch how I am going to join them."

in am

me on

us ox we

Tom and Nora wrote a line each of the words in, am, me, on, us, ox, we, and found all these words easy to write, one letter joining on nicely to the next.

Then they were shown that when starting a word with o or a the joining was simple, but when another letter came before o or a the pencil had to follow round the upper part of o or a

to reach the starting-place for the letter. Their mother wrote a number of little words for them to look at and to copy.

ma ha

la no go

lo to do

These little words, ma, ha, la, no, go, lo, to, do, had to be written again and again before Tom and Nora joined the first letter neatly on to a and o, but when they could do it their mother said she would show them how b, v, r, and w, the letters with little curly tails, joined on to a letter to follow, like this :

ran vow

"Look," said their mother, "how r has to make friends with its neighbor a in ran, and how o sends out a nice long line to w in vow. You see, if they are going to spell a word properly, they all make friends and help each other, so that when we look at ran or vow we know the word at once. Just see how nicely v and w are holding the hands of o, just as if they tried to help it along,

as you help Baby when he tries to walk. Sometimes our pencils have to make long lines to join letters together. Here are some words like that, and we will see how nicely you can write them."

she said. "You see, o naturally ends near the upper line, but the pencil has to come from there to start s. Now, as we cannot mistake s for another letter, even when the first part of it is high up,

for fold nose grip
bun wax gas cough

While Tom and Nora wrote these words—for, fold, nose, grip, bun, wax, gas, cough—their mother pointed out how g joined on to a in gas, and on to r in grip, but quite differently on to h in cough, where the joining line had to reach up to start the loop of h.

"Look carefully at the s in nose,"

the line from o is carried to the top of s."

Nora said she thought the letters were all very nice to help each other in such a friendly way.

Both Nora and Tom, of course, knew how to spell their names, so their mother said they should try to write them and bring them to the next writing lesson.

ARITHMETIC

ADDING BIG NUMBERS TOGETHER

IN our last addition problems, the "ones" added together made a "ten" exactly. Let us try one now in which they do not make an exact "ten."

Add together 58 and 35.

As we did before, we will use the boxes to help us at first. The number 58 means that we must have 5 bundles of ten in the left-hand box, and 8 "ones" in the right-hand box, like this: [5] [8]. To add 35 to this number, we must put three more bundles in the left-hand box, and 5 more "ones" in the right-hand box.

We shall then have 8 bundles in the left-hand, and 13 "ones" in the right-hand, [8] [13]. But we know we must never have more than 9 in the right-hand box; so, from the 13 "ones" we make a bundle of ten and carry it to the left-hand box.

We shall now have 9 bundles in the left-hand box, and there will still be 3 "ones" in the right-hand, [9] [3].

Thus, by adding 35 to 58 we get 93.

To write the problem, we set it down as before, with the "ones" under the "ones" and the "tens" under the "tens."

58 Then say 5 and 8 make 13.
35 Put down 3 (ones) and carry 1
— (ten). Next, 1 and 3 make 4,
93 and 5 make 9. Put down 9.

We have now found out what we mean by "carrying." Whenever the two figures in the "ones" column make as much as ten, we "carry" the "ten" to the "tens" column and add it with the figures in that column.

In the same way that we never keep more than 9 "ones" in the "ones" box, so we do not keep more than 9 "tens" in the "tens" box.

We use a third box, which is placed on the left of the "tens" box, and call it the "hundreds" box. Then, whenever we get ten bundles of ten, we tie them into a big bundle called a *hundred*, and put it into the "hundreds" box.

Suppose the figures on the three boxes are [2] [8] [7]. The number of

things in the boxes is 2 hundreds, 8 tens, and 7 ones. We call this "two hundred and eighty-seven." So 509 is called "five hundred and nine." What are the names of the following numbers: 354, 750, 548, 934, 706?

It is just as easy to write down the figures for any number, when we are given its name. For example: "four hundred and thirty-three" would be 4 hundreds, 3 tens, and 3 ones; that is 433.

"Three hundred and five" means 3 hundreds, 0 tens, and 5 ones; so that the figures for it are 305.

Write down the figures for:

Seven hundred and sixty-three.

Five hundred and fifty-five.

One hundred and four.

Six hundred and seventy.

A group of ten hundreds is called a *thousand*. So again we shall require another box on the left of the "hundreds" box, called the "thousands" box. Then, since we must not have more than 9 thousands in that box, we must tie the ten thousands into a "ten-thousand" bundle and put it into a "ten-thousand" box, and place it on the left of the "thousands" box.

We can understand now how it is that, however big a number of things we may have, the ten figures, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, are quite enough for us to be able to write down what the number is. We never put as many as ten bundles into a box, but tie the 10 into a bigger bundle, and give this bundle a new name and a box of its own.

Instead of "boxes" we generally speak of "places," and so have the ones or *units* "place," the tens "place," the hundreds "place."

The names of the different bundles, starting from the "ones" place at the right, are "ones," "tens," "hundreds," "thousands," "ten thousands," "hundred thousands," "millions." We can go still further, with "ten millions," "hundred millions," and so on, using all the names over again and putting them in front of the word "millions," until we come to "million million." A million million is called a "trillion," but we scarcely need trouble about any more of these names, because we shall not very often want such very big numbers.

So, going only as far as millions, we have the "places" arranged like this:

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	0	2	5	0	3	6

If the figures in the different places are those just written, the number is 1 million, 2 ten thousands, 5 thousands, 3 tens, 6 ones, and is called "one million, twenty-five thousands, and thirty-six."

What is the number 32541? Since we have not the names of the "places" written over the figures, we must count them up. Begin at the 1 and say "ones," then go to the 4 and say "tens," then to the 5 and say "hundreds," and so on. When we get to the figure 3 we shall have said "ten thousands."

So, we know the number is 3 ten thousands, 2 thousands, 5 hundreds, 4 tens, 1 one, or, as it is called, "thirty-two thousands, five hundred and forty-one."

Read 709106. If we reckon up in the same way, we find this is "Seven hundred and nine thousand, one hundred and six."

What are the following numbers? 3072, 52901, 70612, 538124, 6028, 1190123?

To write down the figures which stand for a given number, we have only to be careful to put down 0 for any "place" which is empty. Thus, "three hundred and seven" means 3 hundreds, 0 tens, 7 ones, and the figures are 307.

Write in figures "seventy thousand and twenty-two." This means 7 ten thousands, 0 thousands, 0 hundreds, 2 tens, 2 ones, so the figures are 70022.

As long as we are careful to think of all the names, "ones," "tens," and so on, as far as they are wanted, and fill in as many of each as are in the given number, remembering those of which there are none, we shall not make mistakes.

Write these in figures: Three hundred and twenty-eight thousand, two hundred and thirty-seven.

Fourteen thousand and nineteen.

Seven thousand nine hundred.


One million, two hundred and four thousand, and eighty.

KING SEMIBREVE AND HIS COURT

ONCE upon a time there was a king in fairyland, very big, very important; in fact, he was so big and so important that the only thing to do was to give him a long name. And so he was called King Semibreve. His banner bore this strange device.




He had two knights who followed him in close attendance, and they were called the Lords Minim. The flag they carried was like this , but, because they were only half as important as King Semibreve, they always had to go together whenever they were to represent the king. So a well-known proverb in fairyland is: "It takes two Minims to be equal to one Semibreve." When the royal trumpeters announced King Semibreve, they blew their golden trumpets four times; but when the Lords Minim took the place of the king, the trumpeters gave two blasts for each lord, because one Lord Minim was only worth half one King Semibreve. You see, in fairyland, the fairy who is worth the most in himself is the king.

In this land we are getting to know so well, little black people and little white people play quite happily together, and in this tale we read that sometimes good King Semibreve became a little tired of his two faithful Minims, and he would say: "My good little Minims, you are rather tired to-day, so I am going to give you a holiday,"

and before another word could be spoken the two Lords Minim had disappeared, and in their place stood four little black boys , and the trumpeters blew separate blasts from their pretty trumpets, and all the fairies sang together: "Four little black boys shall represent our good King Semibreve to-day, the Masters Crotchet shall they be named!" Bowing very low before the king, the four little boys

marched away, feeling very important, because, throughout fairyland, trumpeters with golden trumpets proclaimed the news:

King Semibreve wishes to rest,
Two Minims a holiday take;
So four little Crotchets are best,
And the trumpets are blown for their sake.

The trumpeters had to be very careful to make no mistake. If King Semibreve appeared, they must blow their trumpets four times, and a little fairy, carrying a flag like this , would sing, as only fairies can, 1-2-3-4. If Semibreve did not appear, the little men with the trumpets would look anxiously, and directly the two Lords Minim arrived on the scene the little fairy would be quite ready to sing  .

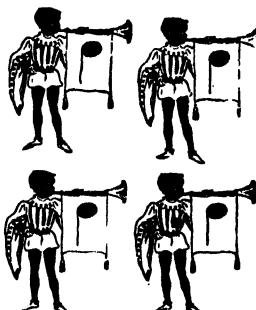
two blasts for each minim; but if the little Masters Crotchet were going to do the honors of the day, then again would be heard the fairy's voice calling out 1-2-3-4, and as she sang each number a little black head



King Semibreve equals 2 Lords Minim



King Semibreve equals 4 Masters Crotchet



1 Lord Minim,
who is equal to



2 Masters
Crotchet

would come up through the ground, till four little black boys were all in a row.

You see, the password for the day was always the same, 1-2-3-4. King Semibreve, the all-great, the all-powerful, had 1-2-3-4 all to himself.

The Lords Minim had to divide the song between them, so Lord Minim I. said 1-2, while Lord Minim II. laughed out 3-4. They knew their song must join, or it would not be long enough for the great King Semibreve.

The merry little black boys had one number each, so when they sang one after the other, 1-2-3-4, it was quite like a pretty peal of bells, and when they thought of it altogether, they knew their song was equal to the song of King Semibreve himself.

It is quite clear that whenever we want to talk about King Semibreve we must count 1-2-3-4, or we shall never find this all-important monarch at home. If we think we would rather have a little time with my Lord Minim, we must remember his number is 1-2;

and supposing we want the gay, wee black boys, we must imitate this pretty peal of bells, and sing out 1-2-3-4.

So we have much to think of—the all-important king named Semibreve, the lords named Minim, the little black boys known as Crotchets, ready and willing to carry out any order that may be given to them. The large and lofty hall known as the Hall of Sound is the favorite meeting-place of our fairies. There the Lords Minim are often to be found; if we want the merry black Crotchets we seek them there; and if we are fortunate enough to be in the hall when the great King Semibreve inspects this corner of his kingdom, we shall see two of the Minims rise and salute him, and gravely will King Semibreve salute in return. Next, four little Crotchets will rise and salute the great Semibreve, receiving with due solemnity his dignified salute in return.

There we must leave them for to-day, but very soon we shall learn a game the fairies play, which has much to do with the story we have been reading.

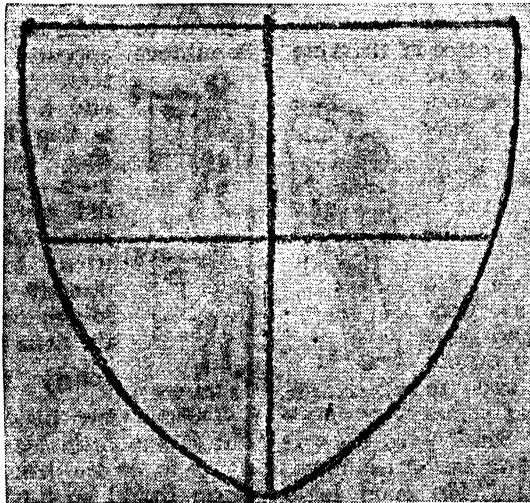
DRAWING

HOW TO DRAW WITH BOTH HANDS

HAVE you ever tried to draw with both hands? It is a good plan to practise making big curves and long lines with the left hand as well as with the right. If you have a blackboard, you can stand a little way off and draw from your shoulder; that is how an artist stands at his easel. If there is no blackboard in your house, you can pin a sheet of paper to the wall and try drawing on that. The wall is not as good as a blackboard, because it does not slant; besides, you can draw over and over again on a blackboard, because you can rub it quite clean with a duster.

But whether you have a blackboard or only a sheet of paper, try a little of this sort of drawing to-day.

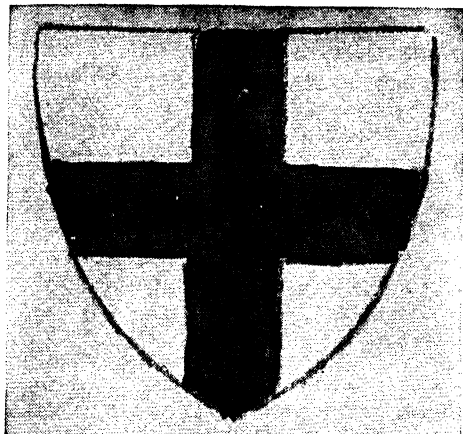
Take a short piece of chalk in each hand, put your hands rather close together, and as high as you can reach on the board or paper, standing your arms' length away from it. Now swing your arms round and downwards and let them meet at the bottom.



This is how our chalk drawing should look when finished

Have you made two nice curves, each as good as the other? Try again, for it is splendid exercise. Don't rub the first lines out if you are using paper but draw the new lines over them, as this is only for

practice. Next try first one hand, and then the other; then try to draw a shield the shape you see in the picture. Begin by holding your hands rather wide apart at the top, swing them round, and join the lines in a point at the bottom and join the dots at the top with a straight line. When you have practised this a little, you



St. George's Cross, to be painted in red

can get a sheet of paper, quite as large as your drawing-board will hold, pin it firm with four drawing-pins, and get two pieces of black chalk or charcoal, some colored chalks, or your paint-box, brushes, and clean water. Remember to slant the board so that it slopes down towards you.

Now make two dots with the chalk about three inches down from the top of the paper. Do you remember how much an inch is? Try to guess three inches down. The two dots must be wide apart, each one about two inches from the side of the paper. Look at the picture to see where to put the dots. Take a piece of chalk in each hand. Let them be small pieces, so that your hands can rest on the paper.

Now hold the chalk in your left hand on the left-hand dot, and the chalk in your right hand on the right-hand dot. Keep your hands firmly on the paper, and swing them downwards, meeting in a point near the bottom of the paper, and half-way from each side.

If you hold your hands firm, and the chalk not too tight in your fingers, you will make a nice line. Never make lines with pencil or chalk so hard that

you can see the mark on the other side of the paper when you turn it over.

Join the dots at the top with as straight a line as you can, and then put another dot in the middle of this line. Guess the middle first, and then see if the two halves are the same, by measuring; alter the dot if they are not, and when it is right make another



Shield, to be painted in two colors

line down to the point at the bottom. Then cross it by another line from side to side about in the middle of the shield.

Now, if you like, you can make a St. George's Cross, by making each of these lines double, as in the picture, and chalking or painting the cross red, as St. George had it on the shield when he fought the Dragon. Or you can paint two of the divisions red and two others blue, or any color you would like your shield to be, if you were a knight going out to fight.

Moisten the paper first. If you have made it too wet, use some clean blotting-paper till it is only just damp, and does not shine anywhere. Take plenty of color in your brush and paint downwards. If you use a mixed color, like green, mix a good saucerful before you begin, because you will not be able to mix exactly the same shade of color again.

Blue and yellow make green.

Red and blue make purple or violet.

Red and yellow make orange.

Red, yellow, and blue make black and grey.

These are four important things to remember.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English word. Third line: As we say it in English.

C'est notre premier jour à Paris. Nous nous éveillons de bonne heure.
This is our first day at Paris. We ourselves awake at good hour.

It is our first day in Paris. We awake early.

La bonne tire de côté les rideaux. Elle dit : "Le jour est superbe."
The nurse draws at side the curtains. She says : "The day is superb."

The nurse draws aside the curtains. She says : "It is a beautiful day."

Nous faisons vite notre toilette. Puis nous descendons à maman.
We make quickly our toilet. Then we descend to mamma.

We dress quickly. Then we go downstairs to mamma.

Nous avons du café au lait et des petits pains. Nous avons bientôt fini.

We have some coffee with milk and some little breads. We have soon finished.

We have coffee and rolls. Soon we have finished.



Nous voulons aller nous promener. Nous courons pour obtenir nos chapeaux.

We wish to go ourselves to promenade. We run for to obtain our hats.

We want to go for a walk. We run to get our hats.

Nous rencontrons une petite fille. C'est notre petite amie du dernier soir.

We encounter a little girl. This is our little friend of the last evening.

We meet a little girl. It is our little friend of last night.

Nous disons tous : "Bon jour !" Nous disons que nous allons nous promener.

We say all : "Good day !" We say that we go ourselves to promenade.

We all say : "Good morning !" We say we are going for a walk.

Elle dit : "Puis-je vous accompagner ?" La bonne répond : "Oui, certainement."

She says : "May I you to accompany ?" The nurse responds : "Yes, certainly."

She says : "May I go with you ?" The nurse replies : "Yes, certainly."



Nous marchons vers les boulevards. Ils ressemblent aux parcs de Londres.

We march towards the boulevards. They resemble to the parks of London.

We go towards the boulevards. They are like the London parks.

Le nom de notre petite amie est Julie. Elle a une balle. Nous faisons un bon jeu.

The name of our little friend is Julia. She has a ball. We make a good game.

Our little friend's name is Julia. She has a ball. We have a good game.

Il est presque l'heure du déjeuner. Nous devons aller chez nous.

It is nearly the hour of the lunch. We must to go to the house of us.

It is nearly lunch-time. We must go home.

THE NEXT SCHOOL LESSONS BEGIN ON PAGE 2227.



THE MAID OF SARAGOSSA

FROM early spring to late autumn had the French soldiers been swarming over the Pyrenees. Murat had come to Spain, and the great Napoleon himself had followed, to work his will on the throne of Spain and to make his brother Joseph king of the country. Napoleon, however, had not counted on the most important thing of all, the national spirit of patriotism among one of the fiercest peoples of Europe, and he found the whole country up in arms against him, unorganized and without discipline, it is true, but the spirit of hatred for the foreign invader was more than he could crush with one blow.

In the summer the French troops besieged Saragossa, and a terrific contest ensued. On August 2, 1808, feigned attacks were delivered at two of the city's gates, and an avalanche of shells was directed from a powerful battery, called San Engracia, against a convent of that name, slaying all the defenders, and rendering it powerless. An envoy from the French general brought the following message to Don José Palafox, the commander of the town. "Head-quarters, San Engracia. Surrender." He replied as briefly: "Head-quarters, Saragossa. War to the knife." The citizens supported him, declaring: "We will defend our-

CONTINUED FROM 1821

selves to the death, and perish rather than surrender."

Then the terrible hand-to-hand conflict went on. Barricades were erected, and the Spaniards defended their town with such a will that, before eleven days had passed, the French withdrew, disheartened by their terrific losses.

Glad of the respite, the inhabitants set to work and re-fortified their city, preparing for the long siege that was sure to come. On December 20, the French army again appeared before Saragossa, and for two months another siege went on. But famine and fever were at work in the city, and the survivors were forced to make an honorable capitulation.

It was during this second siege that Augustina, better known as the Maid of Saragossa, won for herself a heroine's fame. Her lover had fallen in his battery, and she resolved to take his place. In the picture above we see her holding the lighted brand, about to start the fuse on the cannon.

Don José Palafox, the commander of the city, and an Augustin friar are pointing the gun which rests on the battlements of San Engracia convent. Many are the heroic deeds that the Maid of Saragossa performed in the siege, and her memory is honored in this city on the banks of the Ebro as much as that of Don José Palafox, the heroic commander of the city.

THE ELSIE TO THE RESCUE

THE Larchmont, a large side-wheel steamer with three decks and a capacity for immense loads of freight, left her dock in Providence at seven o'clock one mid-winter night. She was bound for New York and carried a heavy cargo and scores of passengers.

A strong northwest wind was blowing as the craft ploughed her way down through the eastern passage of Narragansett Bay, but the full effect of the gale which was blowing out in the Sound, was not felt until the Larchmont rounded Point Judith. Then the side-wheeler pointed her nose full into the icy blast, and continued down through Block Island Sound without any unusual incident until she was well abeam of Watch Hill and within five or six miles of Fisher's Island.

The captain, who had remained in the pilot-house until the vessel had straightened out on her course, took a final turn around the vessel to see that all was well. Satisfied with his inspection, he was preparing to retire when he heard the pilot blow a number of sharp, short blasts on the whistle, the usual warning of danger. He hurriedly redressed and rushed into the pilot-house, and the pilot and the quartermaster pointed out a three-masted schooner bearing down upon them under the strong wind.

The pilot told the quartermaster to put the wheel hard aport, and the latter, keeping his head, did as he was ordered. As the Larchmont was slowly veering round in response to her helm, the schooner came rushing on and even before another warning signal could be sounded on the steamer's whistle, she crashed into the port side of the Larchmont.

The impact of the vessels was so terrific that the big bow of the sailing craft ate its way more than half the breadth of the Larchmont. When the force of the impact had been spent, the schooner temporarily remained fast in the vitals of the steamer, holding in check for a moment the inrushing waters. Then the pounding seas separated the two boats and the flood poured in. Almost at the same time, one of the steam-pipes on the Larchmont burst, and clouds of

steam burst forth, adding to the confusion. The engine stopped suddenly and the vessel began to fill with water.

The passengers, startled from their sleep by the shock of the collision, rushed to the decks. Few even waited to clothe themselves. Their fear was so great that the first penetrating blast of the gale was disregarded. When suffering from the elements became intense, it was found impossible to return below for clothing. The staterooms were flooded, and the steamer, floundering around in the big seas, was sinking rapidly.

The captain promptly ordered every one to his post and gave additional orders that the boat crews should go to their stations, make the boats ready and swing them for instant use. There were eight boats and four life-rafts on the Larchmont. No other boat was in sight that could aid the stricken vessel, so the order was given for the passengers to pile into the boats. Men and women bumped into each other, struggling for a chance of safety. Once the boats were cut away, the pitiable condition of the passengers and crew was increased rather than lessened. Every wave sent a dash of spray over the boats, and soon a thin coating of ice enveloped every one. Even those—and they were few—who were fully clothed, suffered from frozen faces and numbed feet.

Fisher's Island, the nearest land, was nearly five miles westward of the spot where the collision occurred, and every boat at once tried to head for that place. But the boats were heavy and the men at the oars weak. A fierce gale blew on their backs as they strained at the ice-covered oars in their endeavor to make land. The boats and rafts soon became separated.

As the Larchmont slowly settled, thirty of the passengers and half a dozen of the crew who could not get into the boats gathered on the hurricane deck, the highest part of the vessel. When the steamer went down, this deck with its human freight was ripped from the hull by the wind and tossed into the raging sea. The temperature was rapidly falling below zero, and the raging, icy waves swept over the huddled group on the raft until

at last only eight exhausted, half-frozen survivors clung to the wreckage.

In the meantime, one of the boats from the Larchmont with a few survivors in it had reached Block Island, and news of the disaster spread. Many of the islanders volunteered to do battle with the surf on the rocky shores in the chance of rescuing any survivors who might drift in in boats or on pieces of wreckage. Some of the fishermen actually set out in the gale towards the scene of the disaster. Among these was Captain John W. Smith and seven other daring men.

For hours, his little boat, the Elsie, fought its way into the ocean, until her decks and rigging were covered with ice from the seas that swept over the bow. At ten o'clock they sighted the raft and saw that its occupants were feebly signaling for help. Try as she would, the Elsie could not get near the raft. At last four

of the fishermen climbed into the dory that the Elsie was dragging in tow, and though drenched by the icy spray until they were numb, they fought their way to the raft and lifted into the dory eight scarcely living forms, whose clothing had frozen upon them.

After two more awful hours, the Elsie reached land with every one on board almost helpless from the cold. One of the rescued died from the exposure of that horrible night, and all the crew of the Elsie were frost-bitten, though none was permanently disabled.

Each of the fishermen, who had been engaged in the rescue of the survivors of the Larchmont, was awarded a gold medal by the Carnegie Hero Commission, about which we may read in our book, and the education of their children was provided for from the funds controlled by that organization. •

A BRAVE GIRL

ONE bright spring afternoon, a party of young people were rambling through the woods of Pennsylvania. The warm air rang with chatter and laughter as they wandered here and there, picking flowers. Soon they began to separate into little groups, according as flower gathering, bird hunting or other tastes directed them. They had arranged to meet for a picnic supper at the stream up below Rock Falls and in the meantime felt free to roam as fancy led them. The voices grew more distant, sometimes a laugh rang out, sometimes the snap of a dry branch was heard, but the woods were becoming as silent as they had been before the invasion, when a startled cry broke sharply upon the stillness.

Its note was so keen and anxious, that as many of the party as heard it came running from various directions towards the spot whence the cry sounded. They found one of their number, who had been seeking a special fern, said to grow among the rocks in that locality, holding his arm—a horrified expression on his face.

"What is it?" inquired the first comers anxiously, and new arrivals repeated the inquiry, till an excited, chattering group collected on the spot.

In a momentary lull, a low rattle was heard in the underbrush, and it seemed to loosen Billy's tongue.

"Look out!" he cried, half beside himself. "The snake! He has bitten me!"

The peculiar humming noise increased in intensity and pitch, and a chorus of shrieks and terrified exclamations broke from the girls, but the boys plunged into the bushes and killed the rattlesnake. Before they returned, one of the last of the party to arrive upon the scene, a brisk, capable young woman of twenty, took command of the situation.

"Here, Billy," she said, "take off your coat."

Half dazed with fear, Billy mechanically obeyed.

Then Mary Benton seized his shirt sleeve, and without waiting for knife or scissors, took it in her teeth and slit the sleeve to the shoulder. Close to the elbow, in the fleshy upper part of the boy's arm, the two small marks of the rattler's fangs showed red and angry. Mary looked at them without flinching, but the other girls began again their excited exclamations; and Billy's eyes wandered piteously around the group.

"What are you going to do, Mary?" sobbed one of the girls hysterically.

"Wait and see. And, for goodness sake, be quiet, or go away," returned the other shortly, for there was no time to lose.

Bending over the boy, she tied a handkerchief tightly around the arm

above the bite, applied her lips to the wounds and sucked out the poison. While she was giving all her mind to this, some of the boys went off to get the team hitched up to the cart in which they had come. Calmed by her example and coolness, the girls were doing what they could to help, and two of them volunteered to run to the nearest farm house and telephone for the local doctor to meet the team. Mary nodded briefly.

"Tell him what's wrong," she said, and went on sucking. At last she said: "Come, Billy, that's all right. Put on your coat and we'll soon be home."

The team had only gone two miles when they heard the doctor's motor coming up the hill ahead of them. Quick questions, answered mainly by Mary, and a look of relief succeeded the anxiety on Dr. Maylew's face.

"It is your promptness that has saved Billy's life, Miss Benton," he said. "What is that on your lips? A fever blister? Did you know you were risking your own life when you sucked Billy's arm?"

Mary nodded meekly. She did not feel so brisk and commanding now that the need for prompt action was over.

THE BEAR HUNT

GOOMA was a little Hindu goatherd. All his life he had lived with his grandfather in the hills and all his knowledge was of the hills. Sometimes he wondered what life was like in the great beyond, and particularly in Simla, whose white walls he could descry in the sparkling light. Twice in his life—red letter days—he had seen a party of riders, English men and women, winding up and down the *nullah*, or valley, that lay beneath his home, filling the early morning air with their bright chatter. As the days came and went on the quiet hill slopes, Gooma sent out into the future long thoughts, always colored with the brilliance of that gay cavalcade.

One night he sat outside the hut, listening to the sound of an approaching horseman. Indoors his grandfather slept. Gooma walked out of the shadow and waited with a beating heart. Was something about to happen at last—something to vary the eternal silence of the hills and the monotony of service? The horseman stopped. Although of martial bearing, he wore ordinary riding clothes and was unattended.

"Do you live here, boy?"

Gooma salaamed his reply.

"What is your name?"

"Protector of the poor, my name is Gooma."

"Well, now, Gooma, would you like to join me in a hunt?"

Gooma trembled so much with excitement that he could scarcely speak.

"A hunt, sahib?"

"Yes, a hunt. A bear has been seen on the summit of the mountain."

At the word "bear" the light went

suddenly out of the boy's face. His eyes hurriedly swept the starry sky.

"Well?" demanded the stranger sharply.

"It is not wise, Huzoor, to hunt the bear," faltered Gooma.

"Oh, is that it? I see you're afraid. I'll go alone."

"But, Huzoor," continued Gooma, with a deep reverence, "the bear is not abroad to-night."

"What makes you say that?"

"Protector of the poor, the keepers of the bear are elsewhere. The bear does not emerge without his keepers."

The Englishman laughed. At the sound Gooma's face became impassive, inscrutable. He looked straight before him down the *nullah*, where the crescent moon was rising.

"Rubbish!" the stranger muttered as he rode away. "I've run up against some of their precious ideas. I'll wait a night, anyhow."

Gooma stood until the sound of the hoofs was silenced. Then he sought his straw pallet and flung himself across it. It was the first time one of those mighty white men, those beings from another world, had spoken to him, and Fate had arranged it should be on such a subject. Why didn't the great soldier understand? The memory of the laugh cut Gooma's heart. He sobbed in the darkness.

Three nights afterwards the great one reappeared. Gooma was in exactly the same spot. He rose and made a deep reverence. The man looked at him kindly.

"Well, have you changed your mind yet, Gooma?"

The boy made no reply.

"Will you come along and hunt the bear? I ask you because you know the hills better than any one. I will pay you."

"I cannot! If the sahib would only understand!"

The man's kindness was almost more than Gooma could bear. Why couldn't the great war lords comprehend without so much talking?

"Come and sit out here in the good moonlight, Gooma, and tell me why you're so mighty afraid of the bear."

"The sahib would only smile."

"I shall do nothing of the sort. Go ahead."

Gooma looked doubtfully at his companion. The hunter glanced at him and smiled frankly.

"Go ahead," he repeated.

Gooma squatted, native fashion, and began his story. As he spoke, to hide his embarrassment he took up a stone and polished his knife—the sharp, curved knife of the hillman that he always carried.

"It is a very short story, Huzoor. Long, long ago, before the sahib's country was, the animals were very powerful, and they had an overlord to rule them, who was apt to be forgetful. He knew that the bear was sacred, but he let slip the thought from his mind, and the bear began to have many enemies. His food was stolen day after day, and at last the bear sent a complaint to the overlord by the kind little *serow*."

"*Serow*! What is that?"

"A *serow*, Huzoor, in the times that were, long, long ago, was a bit like an antelope and a bit like a goat and a bit like a donkey. He was good-natured, and so he set off to find the overlord. On his way, however, he met great and powerful enemies, and the poor *serow* was hard pressed, and cried out in the fight. Suddenly, seven sisters, shining like moons, emerged from a wood close by and demanded the reason of the *serow*'s cry. Having learned his story, they went on his way with him and found the overlord. The overlord listened to the seven shining sisters, and, as they were idle just then, gave them the particular power to guard the sacredness of the bear, here, on this very mountain. For many hundred years the seven shining sisters, shining like moons, Huzoor, guarded the bears on

this hillside. Then came a period of great and terrible strife, when the gods were at war, one age passing to make room for another. The land was locked in blood, and many beings passed, never to return. Among the rest, the seven sisters fled to the safety of the sky, where they could watch the bear's interests. Look up beyond that jutting tree, sahib. There are the seven sisters."

"But," interrupted the hunter, "those are the Pleiades."

"Even so, Huzoor. And they guard the doings of the bear. It is unwise to raise the strife of ages, Huzoor. The seven sisters have ways of working their will."

The hunter glanced curiously from the sky to the impassive face by his side. There was a long silence, and then the Englishman mounted and rode slowly away, pondering.

"I'll keep an eye on that boy," he thought, "but in the meantime I fancy I'll hunt the bear without his permission."

Gooma watched many nights for the great lord to return. He shrewdly suspected that his story would not alter the hunter's decision a little bit. In Gooma's eyes, the man was dead already, and he was powerless to help. He could not disobey the tradition that had kept his race together for the sake of one man, however noble, of alien blood. The sahib would return, and would hunt, and nothing more would be heard of him. He was not the first. The mountain-top had always done its work well. Nevertheless, Gooma's brown eyes were very sad as he led his goats patiently up and down the slope morning and evening.

One night Gooma sat as usual in the shadow of the wall. He heard the horse's hoofs as the rider made a detour of the goatherd's hut. He knew. The sahib was riding to his death. Gooma tried not to listen, tried not to watch for the horseman to emerge from the trees that flanked the hill. He would have far to go up that lonely steep before he reached the usual haunt of the bear.

A sudden exclamation escaped him. He got up and ran outside the enclosure. Something was wrong. The hunter had dismounted. He could plainly hear in the dead stillness the dual sound of the progress. That was not wise, to dismount and walk leisurely in a track that the panthers occasionally chose for an eve-

ning stroll. A shot rang out, and then another.

In one minute Gooma fought the battle of his life. Should he go to the assistance of the white lord who was in the act of committing one of the greatest crimes in the Hindu calendar? He would never be forgiven by his own people. Then Gooma remembered the man's fine, brave face and soldier's courage. With a stifled prayer for forgiveness, he grasped his knife and ran. Up through the shrub tore his silent, bare feet. Somewhere death was being dealt. He sniffed the air, and a great joy flooded his brain. Whatever came, the bear was not about. The smell was not the smell of the dreaded one. He ran on and on.

He was just in time to see the terrible spring of a huge panther, and the officer's shot that maimed but did not kill. Both man and beast went down in the shock. The hunter was face down, and the long, lithe body was over him. Whistling through the air went Gooma's knife. It caught the glossy head, and a blood-curd-

ling yell echoed and re-echoed through the peaceful valley. The panther rolled off his prey, and lay writhing in a death-agony. As Gooma rushed up, the hunter struggled, unhurt, to his feet. The sharp claws had only torn his coat. A revolver-shot silenced the cries of the great creature; and the sinuous form lay still.

In silence Gooma pulled out his knife from behind the dead beast's ear.

There was a pause, and then he spoke.

"So! Now the sahib must see the bear is defended."

Something stirred in the man's heart as he looked from the stiffening form a few feet away to the boy's faithful eyes.

"I'm going back, Gooma, but I shall not forget what I owe you. You shall enter my private service; is that not so?"

The boy burst into tears.

"Huzoor, I am thy faithful slave till death." Then a sudden thought struck him.

"The sahib will not want me to—"

"No, Gooma. Don't be afraid. I won't. You shall not hunt the bear!"

THE UNKNOWN SCULPTOR

CLANG, clang, tap, tap, clean and sharp through the still air of a great cathedral rang the sound of many hammers, of chisels dressing stone, and of chips of marble falling to the ground. There entered through a side door an old, white-headed man stooping under the weight of a bag of tools borne on his shoulders. His face was lined and careworn, but in his eyes was the light of a great peace. From one to another of the busy crowd of toilers went the old man, seeking work, until he came to the head builder, who, taking pity upon his age and weariness, led him to a dark corner of the church, and said that there he might carve until the work was done. Then the builder went upon his way, and sinking on his knees in the dim light, the old man prayed that his eyes might be keener, his fingers nimbler and his tools truer than they had ever been. "For in this darkness I shall need much help, O Lord," and rising from his knees, he went to his poor lodging to sleep.

Months passed by. Through summer sunshine, autumn rain and winter cold, the old man never failed at his appointed task. Day by day, he was first to reach

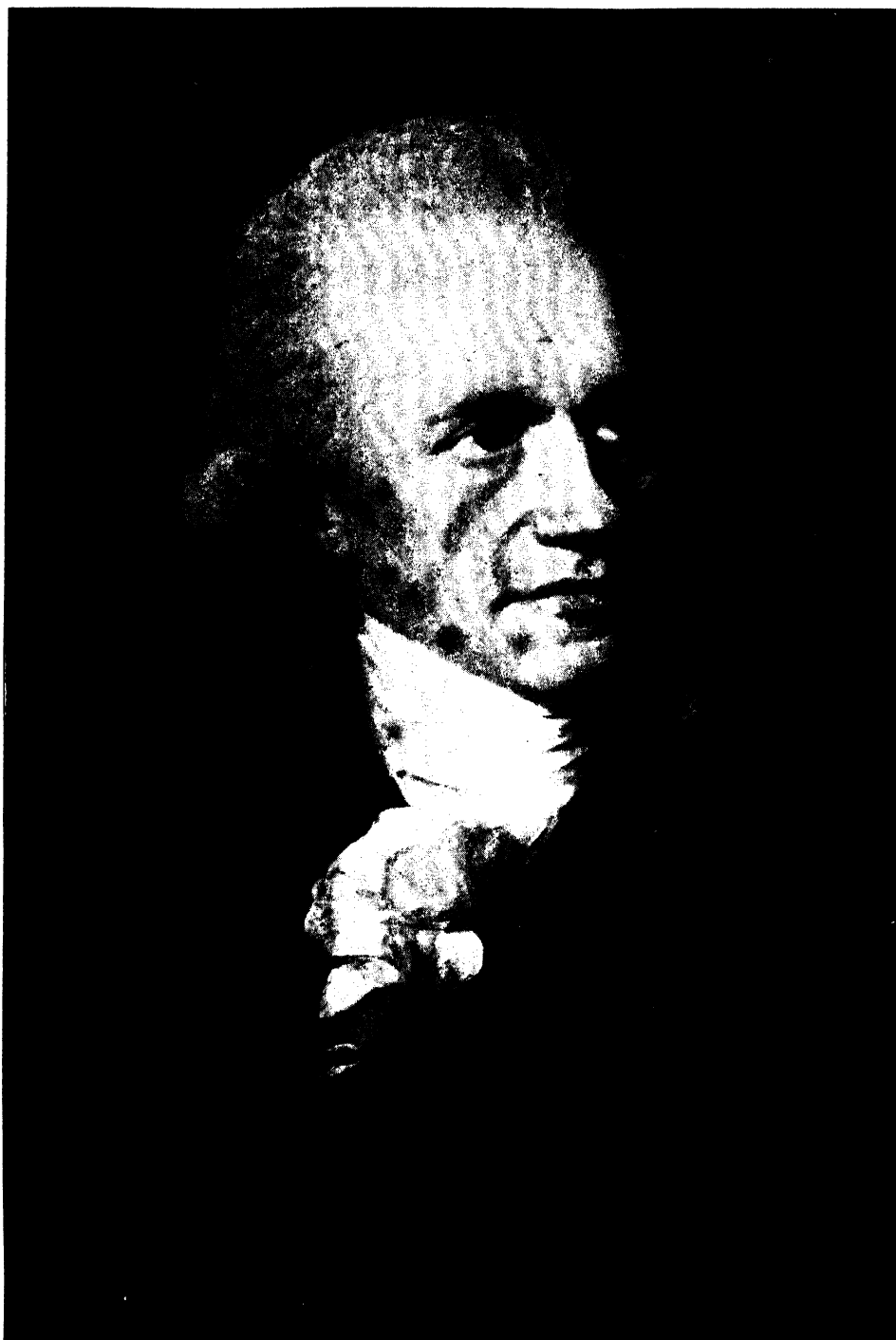
the building, and last to leave, until he seemed to have become part of the work itself.

At length one day when the cathedral was almost completed, one of the workers noted that the old man's hammer was still, and, fearing that he was ill, went up the ladder to the scaffold where he worked. But soon he came quietly down the steps and told his fellows that the sculptor lay dead, his cold hands still holding the tools with which he had worked so faithfully. As they bore him reverently away to the place where he lodged, the chief builder came to the shadowy corner where the sculptor had toiled and was ashamed because he had left the old man there in the darkness. But as he turned to seek the sculptor's work, the setting sun shone through a window and fell in glory on the wall beyond, revealing in its golden light the scaffold, and the work of him who died beside it.

And to this day visitors to the great cathedral await the setting sun and stand in awe and reverence, as they gaze on a pure gem of a great master's art.

THE NEXT GOLDEN DEEDS ARE ON PAGE 2019.

SIR WILLIAM HERSCHEL



This is a picture of Sir William Herschel, the astronomer, who made some famous discoveries regarding the planet Uranus. William Herschel was a poor boy, and it is possible that he might never have become the wonderful astronomer he did, if it had not been for the assistance of his sister, Caroline, who devoted herself to her brother, acting as his workshop "boy," looking after his instruments, doing his housekeeping, copying his papers and helping him with his studies. Caroline, too, became a famous astronomer.

The Story of THE EARTH.

ASTRONOMY

THE earth we live on is only one of many worlds that fly through space. If we are to understand our own world, we must learn about the worlds in the skies, which we can see but cannot visit. In these pages we begin the study of astronomy, the science of the stars. Though men have been "star-gazing" for many ages, it was not until about three hundred years ago that astronomy really began as a true science—just about the time when all true science really began. A Danish monk and two Italians, one of whom was also a monk, were the real founders of our knowledge of the universe; and the greatest name after theirs is Sir Isaac Newton's. These men have taught us that our own earth, and the sun it moves round every year, are only a tiny part of the great universe, which contains millions of such suns and planets, in all stages of their history. And now, armed with the telescope, which brings the stars nearer to our sight, and the spectroscope, which interprets the light of the stars, and the law of gravitation found by Newton, men are learning more and more about these worlds in the skies.

WORLDS IN THE SKIES

BEFORE we could get any right ideas about the earth we live on, we had to find out what this earth really is. We learned that this firm, motionless ground on which we walk is the cool outside of a great globe; and that this globe spins daily on itself, making night and day, and moves yearly round the sun, making the seasons. We had to trace the way in which men learned how to correct the evidence of their senses, which seem to say very plainly that the earth does not move, and that the sun does, and then, when we knew what the earth really is, we could go on to study the stuff of which it is made, and the way in which it changes and *does things* from moment to moment.

Now, it is always true that if we are really to understand anything we must study not only the thing itself, but also what is around it. We cannot understand a part of any great whole until we understand something, at least, of that whole. We cannot even understand ourselves unless we study the conditions of our lives, our parents and schools, what we read, the air we breathe, the things we hear people say, and so on. And in the case of the earth we can never hope to understand it unless we study the great world of which it is really a very tiny part. This study is known as astronomy—the

CONTINUED FROM 1891



word means the *law of the stars*—and it is in many ways, though not in all, the most marvelous of all the sciences. I think it is right in this case, as it is in every case, that we should begin by a very short history of men's knowledge of astronomy.

It is probably the oldest of the sciences. Men were always interested in the weather, in changes of climate, and in the sun, which plainly has so much to do with what happens in the sky around us. The sun and moon were closely watched by men, probably, before anything else at all. Also the stars are far more brilliant when they are seen through the clear air of warmer countries than ours, such as Arabia and Egypt; and as they seem to be fixed they can guide men on the sea and on land. Thus, astronomy was *useful* from the first, as it is useful to-day, though most of us have no idea how useful it is. So it comes about that we find proof of astronomical knowledge long ages ago, even thousands of years before the birth of Christ. This is specially true of the East, more especially of Western Asia and Egypt; but it is also true of Great Britain, for Stonehenge proves at this day that definite facts had been learned about the movements of the sun sixteen hundred years before the birth of Christ. This we learn by noting the way in

which this ancient temple was built ; and we find that it was not only a temple for worship, but also an observatory for the observation of the sun, moon, and stars.

The names of most of the sciences, we know, end in *ology*, and we might expect the name of the science of the stars—using the word stars to include all the bright objects in the heavens—to be astrology.

THE ALCHEMISTS AND ASTROLOGERS WHO BEGAN THE STUDY OF THE EARTH

We use the word astronomy, however, to distinguish this real science from an unreal science which came before it, and which was called astrology. If we turn to the great science of chemistry we find exactly the same thing. Before what we now call chemistry came into existence there was an unreal science called alchemy—which is really the same word. The alchemists were searching for the philosopher's stone that was to turn everything into gold, and for the elixir of life that was to turn or keep everybody young. The alchemists were foolish in looking for these things, and they were almost always wrong in the way in which they interpreted the results of their experiments. But we could not have modern chemistry if there had been no alchemists. They were patient men who made numberless experiments and noted numberless facts. They laid the foundation of chemistry, and though they were wrong in their objects, and wrong in their ideas of the meaning of what they noticed, yet we profit in a thousand ways by their discoveries to-day.

And, just as every modern chemist is indebted to the alchemists, so every modern astronomer is indebted to the astrologers. We could not have had our modern astronomy but for them. They, too, like the alchemists, were eager and patient men, and they observed thousands of facts about the heavenly bodies.

THE STRANGE THINGS MEN THOUGHT LONG AGO ABOUT THE STARS

They were wrong in the way in which they interpreted those facts, but a fact is a fact for ever, and since it is part of truth, is a part of true science ; nor does it matter, in the long run, that the man who observed it misunderstood it—whether sincerely or dishonestly. We

find in the early history of every race and nation that we can trace a kind of astrology—that is to say, a study of the stars in the belief that they controlled the fates of men. Egypt and Persia, Arabia and Greece, the Chinese and the Hindoos all contributed to astrology, and so when civilization began in Europe it took over these ideas from the first. They flourished for thousands of years, and even to-day we can buy for a nickel foolish almanacs which pretend to predict what will happen on the earth by studying the stars. The astrologers took those of the planets that they knew, and connected human characters with them. Venus had something to do with love, they thought ; Mars with war, and so on. They divided up the sky into various parts, and supposed that when a certain planet entered a certain part of the sky corresponding results would occur for human beings, especially for anyone who was born just at the moment when that particular part of the sky happened to be going to rise above the horizon.

ERRORS OF THE PAST WERE THE PARENTS OF THE TRUTH WE KNOW TO-DAY

We know now that all this was nonsense ; but it would be very foolish and vain for us to imagine that we would have thought so if we had lived in those days. One of the most difficult things in the world is for any of us to imagine how he would feel and what he would think if he lived in a world of knowledge and ideas very different from our own. We must not despise those who believed in astrology, nor fancy that they were very foolish compared with ourselves, or we shall find that we are despising some of the greatest men who ever lived. Kepler, for instance, who discovered the laws that govern the movements of the planets, and the great English philosopher, Francis Bacon, believed in astrology to no small degree. What those men were capable of believing we should certainly have been capable of believing if we had lived in their time.

Great men though they were, they knew nothing at all of many facts that we know well—facts many of which they discovered themselves. We are standing on their shoulders, so to say, and so, though we are small and they were great, we can see further and clearer than they.

THE LIGHT THAT HAS BEEN TRAVELING SINCE THE SPANISH ARMADA



When we look up at the stars it is hard to believe that we are looking at the light from a star that may have ceased to exist a thousand years ago. Yet that is quite true. What we call the stars is the light flashed through space from stars millions of miles away. Although light travels so quickly—186,000 miles in a second—some of the stars that shine to-night are so far away that the light we see may have left them before Jesus Christ was born. In this picture our artist has tried to help us to understand this. At the time when the Spanish Armada went to England, a new star came into existence. Nobody saw it then, but our artist has shown it in the sky above the Spanish ships. That was over 300 years ago, and the light from this new star has been traveling ever since; yet it was only about 1900 that the light reached the earth. This picture shows a girl reading the story of the Spanish Armada to-day, while her brother looks at the starlight which started on its journey about the time the Armada was sinking.

could. Astrology lived on, and was bound to live on until astronomy was born. The error was the parent of the truth, and then the error had to die.

Of all the astronomical discoveries, one stands out as that which, beyond all others, destroyed astrology, and that was the discovery by Copernicus that the sun and not the earth is the centre of the solar system. We must remember, too, that in this case, as in every other, people will believe the false unless they know the true. So in our own time and in the future, wherever there are people who do not know anything about astronomy, they will believe in the rubbish that astrologers tell them. There is no real remedy for error but truth.

We have already learned that astronomy was useful from the first, and we should particularly notice the difference between the real use of real knowledge and the sham use of sham knowledge. The astrologists declared that the study of the stars was useful because it enabled them to predict what would happen to men—which is a thing that men always want to know.

HOW THE STARS GUIDED THE TRAVELER IN THE EARLY DAYS OF THE WORLD

Sometimes they happened to be right, as anyone may happen to be who makes a prophecy, especially if he takes care that it is a likely one. But usually they were wrong, and so they were not merely useless, but worse than useless. Yet all through the time of astrology there was a certain amount of real astronomy known, and this was useful then as it is now. Especially was it so because observation of the position of the stars guided travelers, whether on the sea or on the land. Traveling has always been important, but there were no good maps in those days, and the compass was only known in China. The skies are almost always bright, however, in Egypt and Arabia and Greece, and so the stars could always be seen at night to help the traveler to his goal. Every ship that crosses the sea is indebted to astronomy to-day, and always will be.

But the thing we should notice particularly is the difference between the sham knowledge and the real knowledge—the worse than useless and the very useful. They both depended upon facts and upon the same facts—that such and

such stars could be seen at such and such places at such and such times. But the sham knowledge with its bad consequences depended upon a false interpretation of true facts, while the useful knowledge depended upon a true interpretation of the true facts.

HOW MANKIND WAS CHEATED AND LED ASTRAY FOR THOUSANDS OF YEARS

The great lesson which we have to learn from this applies to all knowledge of every kind; whether we are studying stars or disease or the rocks or history or anything else, there are always two things which it is our business to find out. First come the facts, and then comes the meaning of the facts. We must have the facts first, and we get these either by simply observing—as when men look at the stars, or by making experiments—as we do in chemistry. The facts are facts whether we understand them or not, and in any case we must have the facts first. After that comes the business of trying to understand what the facts mean, and if you do not know what they mean it is much better to say so and to go on looking for more facts, rather than to pretend you know what they mean.

We thank and praise the astrologers for finding many facts, but we cannot thank them, and are, indeed, bound to blame them, because they pretended to understand them when they did not, and because for thousands of years they cheated mankind with their pretended explanations. The astronomers of to-day ask money from mankind as the astrologers did, but they do not ask it in return for sham prophecies as to what will happen to you and me. They ask it for telescopes and observatories, so that they may learn more about the wonderful world in which we live.

BRAVE MEN WHO SUFFERED FOR BELIEVING WHAT ALL MEN NOW BELIEVE

Our more definite knowledge of the history of real star-science begins with the Greeks, and we know that some Greek astronomers had discovered the true shape of the earth, the fact of its spinning and its revolution round the sun. Then these truths were denied and despised, and for many centuries men went back to the old view that the earth is motionless and flat, and that the sun goes round it, as it certainly seems to do.

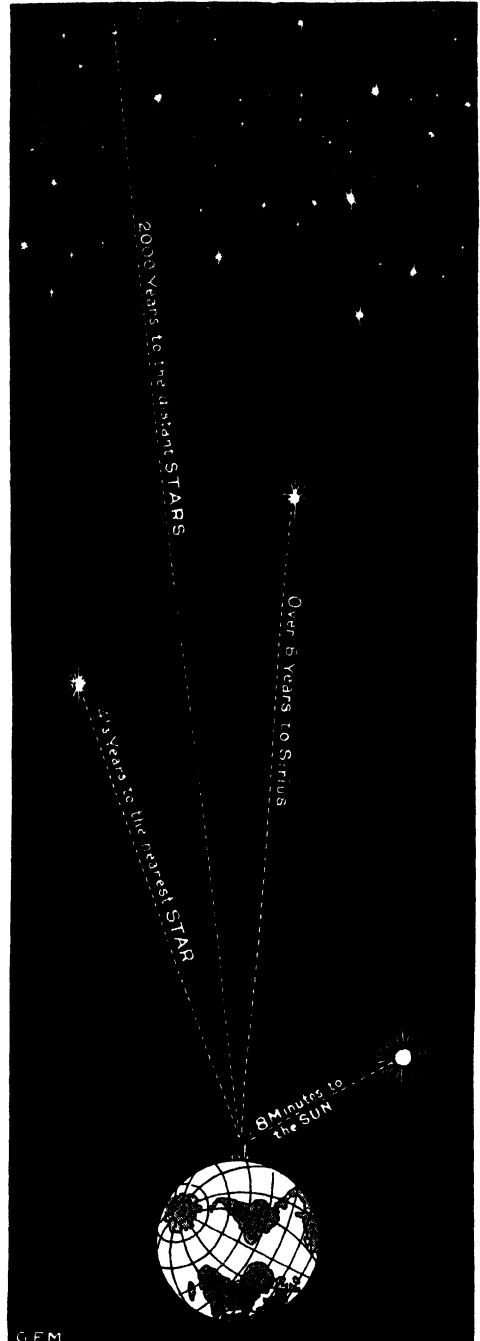
But in the sixteenth century there arose a great man, a monk, called Nicolas Koppernik, of Denmark, whose name we now know in its Latin form of Copernicus, and he proved again the truth that had been lost for nearly 2,000 years, that the earth goes round the sun, and that the other planets, such as Mars and Venus and Jupiter and Saturn, do so too.

His great follower, the Italian, Galileo, made use of the telescope. With it he completed the proof of the view held by Copernicus. He found that Venus has phases like the moon, showing that it goes round the sun in a path *inside the path of the earth*, and he found four of Jupiter's moons, showing that it was like the earth, which also has a moon. And so we learned to think of the sun and his family, the *solar system*, about which we have already read a little in this book. Galileo was finally, after much discussion, stopped and silenced by the Inquisition. He was made, under threat of torture or death, to declare that his discoveries were false. He was not allowed to teach in public, but continued to study and write, even after he became totally blind. His last years were lonely and sad, but his glorious name will be revered and honored by all men as long as mankind endures.

About the same time there lived a man, once a monk, like Copernicus, of Denmark, who saw farther and deeper than either Copernicus or Galileo, though he was not an actual discoverer with his own eyes. He was an Italian, named Giordano Bruno; and if you think of him as if his name were George Brown, you will realize that anyone, anywhere at any time, may make his name immortal. Bruno, or Mr. Brown, as we should call him in English, was the first man to teach a new theory of the mighty universe in which we live, and so his work is of lasting interest to all men.

We saw what Galileo's earthly reward was; but Galileo sacrificed himself, at least in some degree, by denying what he knew to be true; and so we cannot say that he was so completely a martyr for the truth as he might have been. *Martyr* really means *witness*, but we use the word to mean a witness who pays for his testimony with his life. Bruno was attacked, as Galileo was, soon

IF WE COULD TELEGRAPH TO THE STARS



This picture helps us to understand the distance of the stars. A wireless telegram travels fast enough to cross the earth in a second, but it would take 2,000 years to send it, if we could do so, to the distant stars.

afterwards. He, too, recanted, or took back what he had said, for a time; but afterwards something within him made

him ashamed of doing so. He boldly declared again what he believed, and the Inquisition condemned him to death in 1600. Bruno, however, had broken his vows, and had advanced many strange ideas of religion, and the Church has always declared that he was punished as an unrepentant heretic and not as a man of science.

HOW ISAAC NEWTON CARRIED FORWARD THE TRUTH

If the time is ever to come when the world ceases to misunderstand such men, it will be when children learn from their childhood upwards that nothing can stop the truth; that to fight against it is to fight against God, and therefore to be beaten at last; and that the only safe and wise and right course is to give an honest and reverent hearing to all sincere men and women, whether we think them right or whether we think them wrong. God will judge and decide in His own good time; and He has said: "Judge not, that ye be not judged."

Before we learn what Bruno taught the world, there is one other name which we must learn in the history of astronomy. It is that of an Englishman, Isaac Newton, who discovered the law of gravitation, by which the universe is balanced. This he did when he was 23 years old. When he published his discovery people said that he was wicked, and was trying to take away from the glory of God; but now all men honor him, and see that the more we learn about Nature the more we learn about the wonder and power of its Great Author.

THE FIRST MAN TO UNDERSTAND THAT ALL THE STARS ARE SUNS

When Bruno read and thought over the work of Copernicus, there came into his deep mind the true view of what our universe really is. The first great truth he saw was that the sun—our sun—must really be one of the stars; and with that great idea in his mind he began to think of the other stars. So he saw that *if the sun is a star the stars are suns*.

Consider how tremendous is the meaning of that sentence, and especially of its conclusion: *the stars are suns*. Men had thought of the earth as the centre of all things, the sun as its attendant,

daily moving round it, and the stars as little points of light—mere trifles, giving no useful light, and meaning nothing, unless that somebody would meet with an accident in a certain year, or that someone else would win a victory, if certain stars could be seen at certain times. And then Bruno came and taught that these little points of light were suns, like our own, perhaps vastly bigger and more important, and that probably there were planets circling round them with living creatures, perhaps as intelligent as men, or even more intelligent than men, upon them. This is the most humbling discovery to the pride of human beings that men have ever made, and it is also the grandest. Some thinkers and theologians had suggested it before, but the world was not ready to believe them.

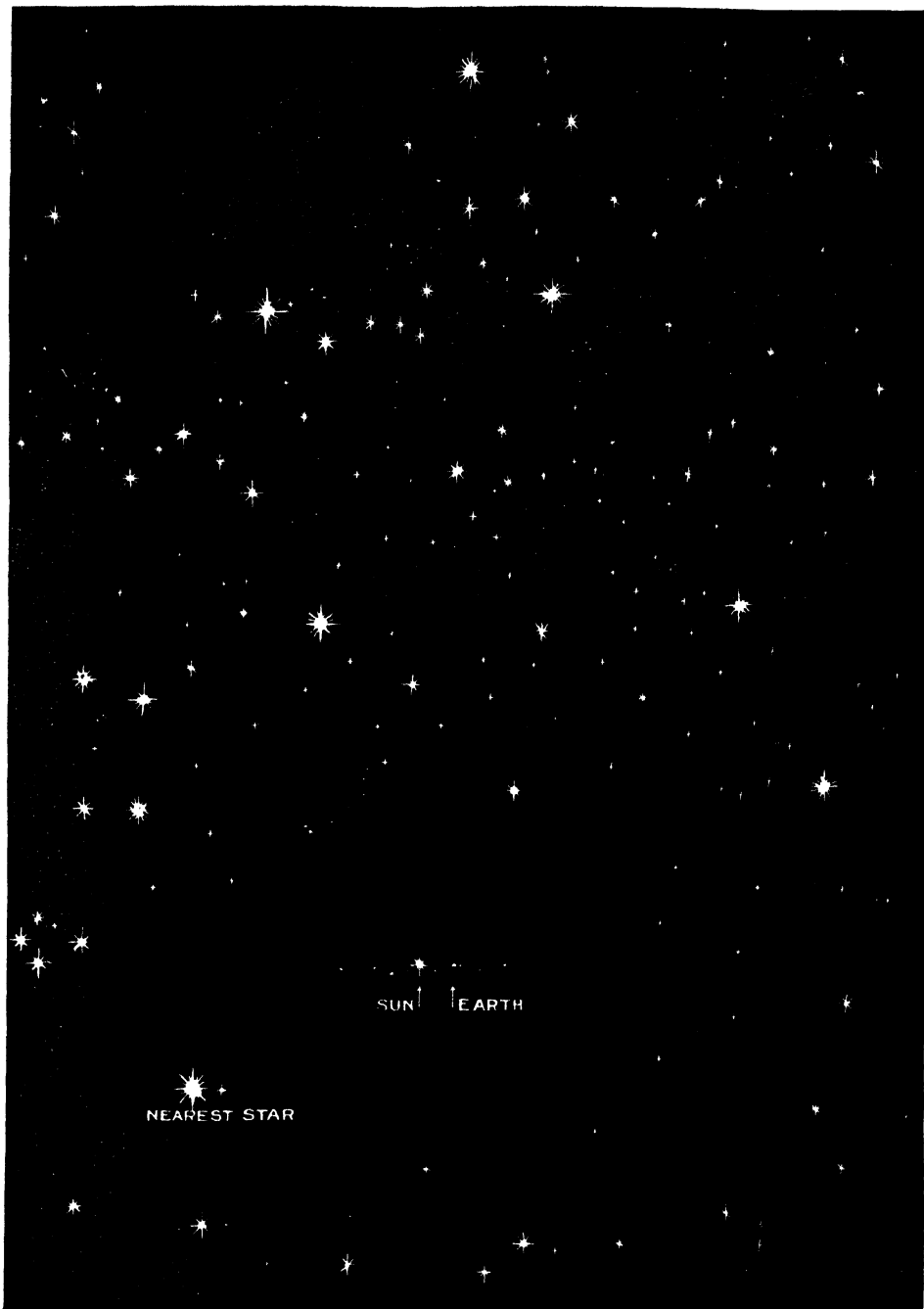
THE EARTH IS AS A GRAIN OF DUST IN A MIGHTY MASS OF WORLDS

The universe, then, consists chiefly of a vast multitude of stars, of which we can reckon not less than one hundred millions already. Of these our sun is just one, and certainly neither the biggest nor the brightest, though infinitely more important to us than all the others put together. Around any number of these stars there may be planets, perhaps with moons, circling as we do round our particular sun. And the whole of our earth is but as a grain of dust compared with the whole mighty mass of worlds which we can see on any fine night from the earth's surface.

As to the size of the visible universe, we learn similar lessons. The earth is quite small compared with Jupiter, the giant planet, and Jupiter is small compared with the sun. But if the whole space surrounded by the path of the outermost planet, Neptune, from the sun outwards, were one solid mass, a mighty ball in which sun and earth and Jupiter and all would be lost like drops of water in a lake—even then this great globe would be nothing in size compared with many of the objects we see in the sky, and the distance from boundary to boundary of it would be nothing compared with the distance from it to the nearest star.

In looking at the sky, then, we must always remember the meaning of these

THE LITTLE DOT WE LIVE ON



Our world is like a speck compared with the whole universe. There are so many stars that to count the stars we see and say that these are all the stars would be as if we were to count all the automobiles in America and say that these were all the automobiles. And all the stars are suns ! The sun is great enough to give heat to 2,000,000 earths like ours ; yet this sun is one of the smaller stars, and millions of greater suns move round in space. In this vast universe is the solar system, of which our earth is a part. This picture shows us the solar system and its place in the universe, and, though all the distances cannot be properly represented, the picture shows us what a mere speck of the created universe our earth is, and helps us to realize why the mind of man is utterly unable to conceive the grandeur and wonder of creation.

tremendous distances between stars and stars, and we must not be deceived, as so many men have been deceived, by the apparently *equal* distance of a planet and a star beside it.

THE LIGHT THAT HAS BEEN TRAVELING SINCE THE SPANISH ARMADA WENT DOWN

It is not merely that the planets—which belong to our little system—are nearer than the stars, but that, compared with the stars, they are at our very doors, while the stars are almost infinitely far away. Something happened to a star which we noticed some years ago, and much attention was paid to it. Yet we reckon that whatever it was really happened about when Queen Elizabeth reigned in England, and the light that then left the star only reached our eyes a few years ago.

Thus to the eye of the astronomer the bright points in the sky are of two utterly different kinds. All but seven of them—among these scores of millions—are suns, vastly far away, and many of them vastly bigger than our sun. But seven of these bright points, together with the sun and the moon, and the moons of the other planets that have moons, and a number of very tiny planets, perhaps as small as an American county, that can only be seen through a telescope, are parts of the solar system; they belong to us, they are close neighbours of ours, and have nothing to do with any of the stars among which they seem to lie.

Now let us make a list of the various things that make up the universe, and that astronomers study. First, we shall note down the things that make up *our* system; we shall think of it as a kind of sample of what makes up millions of other systems in the sky—only that they are so far away that we can only see the suns—or stars—of those systems.

THE THINGS THAT MAKE UP OUR PART OF THE UNIVERSE, THE SOLAR SYSTEM

Our system consists of the sun; the eight large planets of which our earth is one; the moons of those planets; the minor or lesser planets, which all revolve round the sun in a sort of heap, in a path outside the path of Mars and inside the path of Jupiter; a large number of tiny things like stones and pebbles and pieces of rock, much too small for us to see,

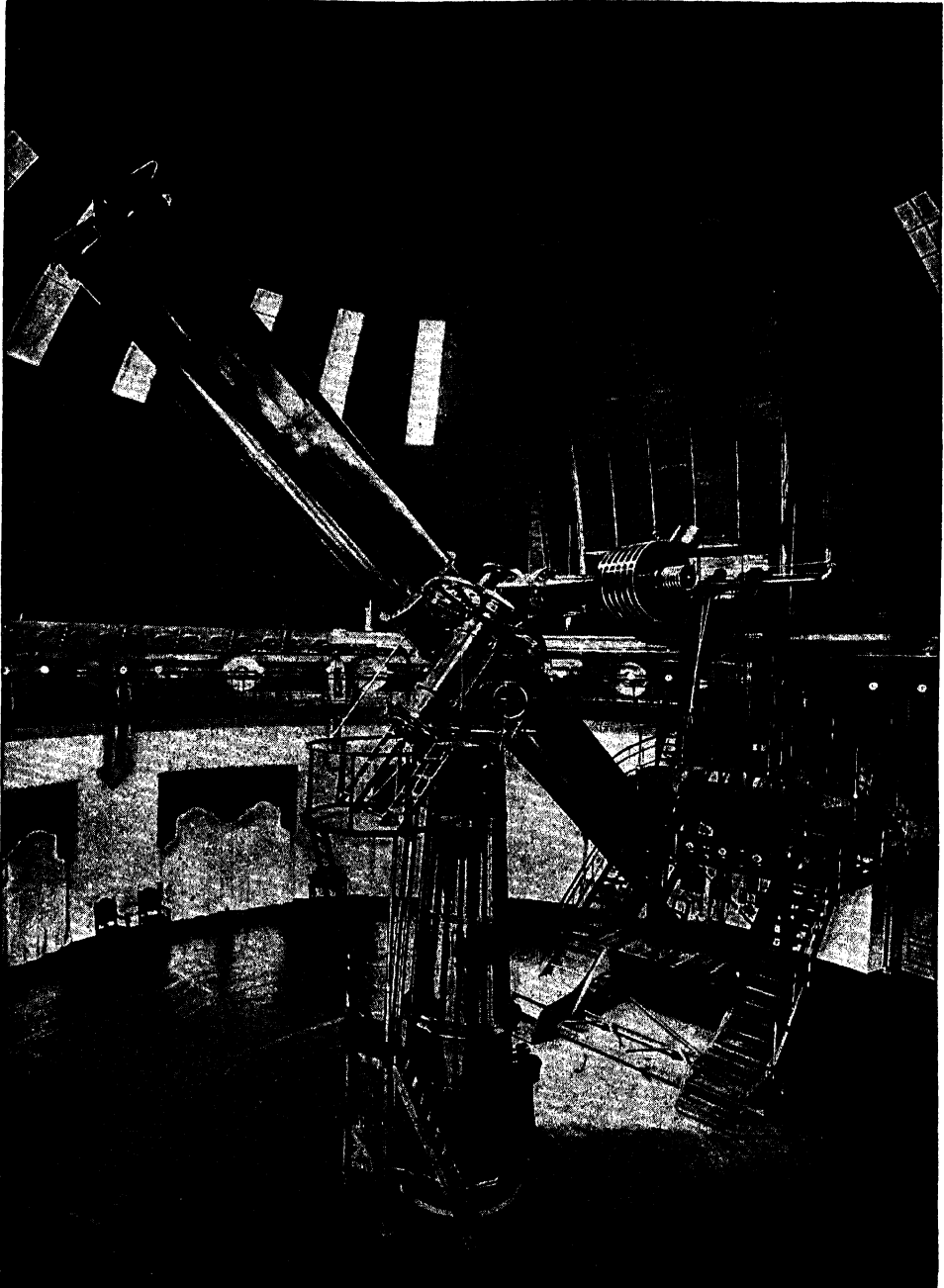
except when they are caught in our atmosphere and made bright, when we call them meteorites, or "shooting stars"; and a few curious things called comets, which also move round the sun and belong to our system. We ought really to learn this list. It is much easier to learn than a list of dead kings, most of whom could not read, and it is quite as important. The pebbles, the comets, and the minor planets are the things you are most likely to forget. The names of the major planets we have learned already on page 148, and we certainly should learn them and their order outwards from the sun.

Again we must remind ourselves that several of these things may be seen in the sky, either with the naked eye or through a telescope, just as if they were stars, but they are really just about as far from the stars as we are, and belong to us. When astronomers discover a new minor planet—and there are hundreds of them known—they cannot tell whether they are dealing with a tiny little planet, perhaps smaller than Rhode Island, or a star that may be vastly bigger than the sun, until they find that it moves or wanders among the stars, and so is a planet, or *wanderer*.

THE GREAT DIFFICULTY OF UNDERSTANDING THINGS SO FAR AWAY

The difficulty people have in learning how utterly different Venus is from a star like Sirius is a difficulty that even astronomers have to reckon with, so great is the influence of distance in deceiving us as to the comparative importance of things. If someone breaks his leg next door we think it more important than if twenty thousand people were drowned by a tidal wave in China; and most people read the papers as if a murder that happened yesterday was a thousand times more important than the Crucifixion or the death of Socrates or Bruno. We must learn from astronomy that a very tiny thing may be taken for a very big thing, if only it happens to be near enough. We have all heard about Shock-headed Peter, who fell into a pond because he looked up at the sky instead of where he was going. Of course, he should have been more careful; but we should think better of him, or of anyone who values great and beautiful things that are far away, than of people who think of

ONE OF THE WORLD'S GREATEST TELESCOPES



This is one of the great telescopes which reveal to us the mysteries of the planets. They make the heavens seem so near to the eye that we know more of the planet Mars, for instance, than we know of some parts of our own world. In a modern observatory the floor is raised and lowered by hydraulic power, and the instrument is moved by heavy machinery to any position, though weighing many tons. Yet, though this instrument is so vast, it is so exact that only a microscope can show the slightest error in its mechanism. A telescope like this costs a fortune to make and to maintain and may take years to complete. Nineteen times the makers failed before they could make a perfect lens for the Lick Observatory telescope. An early telescope was made by Galileo, of whom we read on page 1678, but Galileo never looked through a telescope which brought the wonder of the heavens so near to man as this one does.

nothing but what is around them, and think that a gas-jet is brighter than all the stars. It is brighter to our eyes; but the eyes of our minds should know better.

We can never know any other of the millions of solar systems as we know our own, but whenever we look at a star we must think of it as Bruno thought of it, and remember that it is probably *the sun* to other planets, and perhaps to intelligent beings not very unlike ourselves. But in the universe, outside the little limits of our solar system, there are many other things besides stars, and we know what these various things are. Then, when we have got firm hold of the right idea of the universe and what it is made of, we shall be ready to study some of these wonderful things more closely.

We discover in the heavens, apart from our small system, many bright stars. Without seeing them, but in other ways, such as by noticing how they disturb the bright stars, we discover also many *dark* stars; stars that have grown cold and "gone out."

THE COUNTLESS NUMBER OF STARS IN THE SKY AND THEIR MANY KINDS




A well-known astronomer, Sir Robert Ball, has said that to look at the bright stars—the stars we can see—and say, "These are all the stars," would be like counting all the *red-hot* horse-shoes in England, and saying, "These are all the horse-shoes." The bright stars are probably very few compared with the dark ones. Bright stars and dark are of many different kinds, but we shall read about them later. Here we must remember both of them as helping to make up the mighty population of the skies. And after them we must put down the names of the *nebulae*. Nebula means *cloud*, and *nebulae* means *clouds*. The nebulae are things which *look* like tiny clouds among the stars. We have already learned that the solar system was made from a nebula; and we believe that all the stars, and the systems of which they are the suns, were also made from nebulae.

There are many stars in the heavens which seem to be still only half-made—still more "star-mist" than star—and these we call nebulous stars. On page 1969 is a photograph of the great nebula in Orion, in which six stars can be seen to

have already condensed. You can see Orion for yourselves in the early winter evenings in the south, and the picture on the opposite page will show you which is the nebula. To our naked eyes it looks like a star—the middle star of three forming the dagger of the huntsman which the ancients thought Orion looked like.

It is almost certain that there are dark nebulae as well as bright ones, and that we must therefore remember both kinds as we remember both kinds of stars.

THE MYSTERIOUS JOURNEY OF A COMET THROUGH SPACE

There are also in the heavens many comets besides those that belong to the solar system, and go round the sun as regularly as the earth does. A comet is quite a small thing, really, and requires to be near to be seen. Even the comets that belong to the solar system can only be seen from the earth occasionally, and that is when they come comparatively near to the sun. The comets in outer space cannot be seen. But we know that they are there, since some of them occasionally visit us. After rushing through space for the vast distances that stretch between star and star, they may visit *our* star, the sun, and after rushing round him may fly away again into space and be seen no more—by us. Astronomers know that these comets do not belong to the solar system, and will never return, as the paths they pursue are not *closed* paths, like a circle  or an ellipse , but open ones, like this , which carry the comet through space, perhaps never visiting the same star twice, until its history ends in its breaking up into little parts like the stones we call meteorites.

THE GREAT INSTRUMENTS THAT HELP US TO READ THE SKY AS IF IT WERE A BOOK

These, then, are the various kinds of thing that astronomers have to study. In doing so, there are certain means that greatly help us. The first is an instrument of the mind—our knowledge of the law of gravitation. Everyone knows that something pulls objects towards the earth so that, if unsupported, they will fall. It was left to Newton to show that the moon has a similar relation to the earth, and that the earth and all the other planets are ever tending to fall

towards the sun. It was said, less than a hundred years ago, that we should never really know whether gravitation is true outside the solar system—whether it is at work among the stars. Yet we already know that it is at work among the stars, and we believe that it applies everywhere. Our knowledge of this law is used in all our study of astronomy, and is always the instrument that leads us to fresh knowledge—a great proof of its truth.

Then we have two great instruments of another kind. The first is the tele-

scope, which shows us the heavenly bodies, and helps us to trace their movements. The second, much newer, is the spectroscope, which sorts out the light they send us into its various colors, and so enables us to say of what the heavenly bodies are made. Thus we can prove that hydrogen and iron and calcium and carbon and oxygen, and many other of the elements we know on the earth, are in the stars and make them up. This is in itself one of the most important and wonderful discoveries ever made. As we

have nothing but their light by which to study the stars, and as we can already study that light in fullest detail, the future may never give astronomers any other instrument more valuable than these; but it is best not to be sure when we say what will not be possible in the future.

We shall now begin to study the different kinds of heavenly bodies. To begin, we must describe them. We must look at the sun, find what he is made of, how he gives his light, what

his spots are, whether he has an atmosphere. We must study the moon, our nearest *constant* neighbor in space—though comets and meteorites come nearer occasionally—and we must learn from the moon what the earth will become at some distant date. We must look as closely as possible at the planets, especially at Mars, which is so much like the earth in many ways, and is, indeed, so near that we know more about its North Pole than about parts of our earth. And when we have learned all we can about the solar system, not

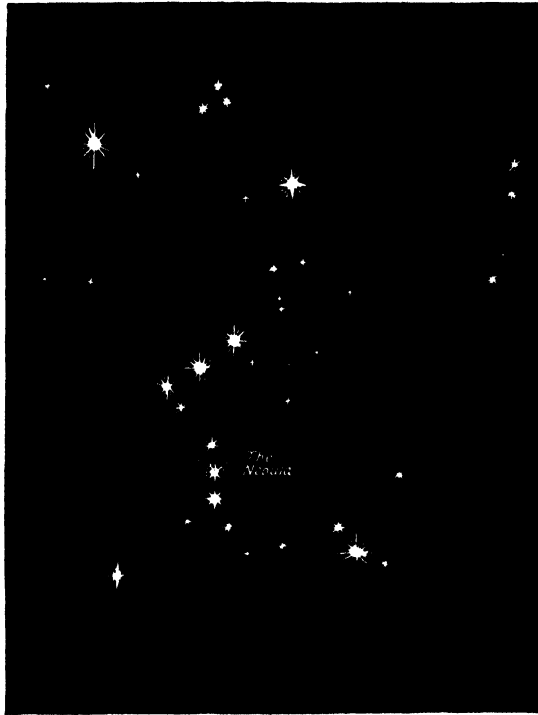
because it is necessarily the most important or wonderful of such systems, but because it is the only one we *can* study, we must look at the stars and describe the various kinds of them, hot and cold, "calcium stars" and "hydrogen stars," single stars and double stars, nebulous stars, variable stars, "fixed" stars, and so on.

And after all this we must remember that the description of a thing is not the same as the explanation of it.

This is true of a small boy, or a mighty star, or anything else. We must try to ex-

plain, as far as we can, the history and the making and the fate of the stars, the reason of the Milky Way, and the meaning of the whole. We shall not be able to answer all the questions that will come to us, but we must do what we can; and though it has often been said that men were not meant to study these things, we shall find that the more we learn the more wonderful and splendid do we find God's work to be.

THE NEXT PART OF THIS IS ON PAGE 2087.



This is the constellation of Orion, which shines brightly in the south in winter evenings. It is due south at midnight in January, and earlier in February and March. The nebula is the middle star of the three which form the dagger of the huntsman whom the ancients thought the constellation resembled.

GRACEFUL BIRDS ON LAND AND WATER



Darters perch and nest in trees though their feet are webbed. They swim and dive most wonderfully.



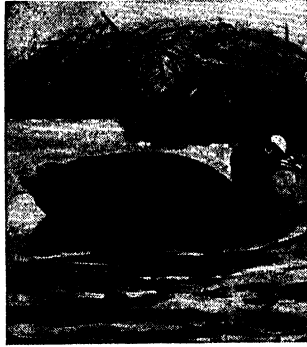
The purple heron is a very slender-necked and graceful bird. Here we see its nest made of leaves of reeds.



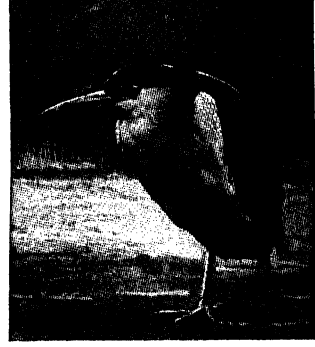
The pelican is an ugly bird on land, but it is graceful in water and flies beautifully. It is an expert fisher.



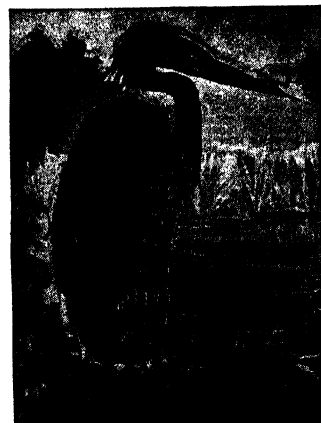
Water-hens make nests of vegetation in lonely ponds and streams. They swim and dive, and run swiftly over the fields and moors.



The coot is like the water-hen, but it will not eat young birds, as the water-hen does. It eats vegetable matter and fresh-water shellfish.



The night-heron is like an owl in its habits. It sleeps in the day and searches for food at night, coming out when other birds go to bed.



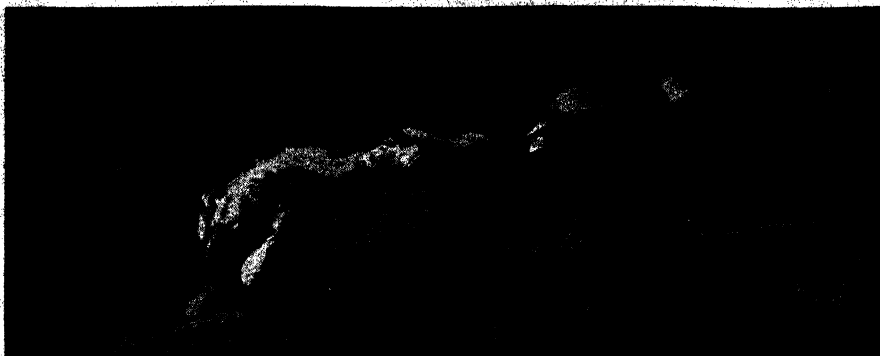
The Goliath heron is the giant of his family. Here we see him in his plumage for the courting season.



The common heron is about three feet high, and may be found East and West and in far-away countries.



The egret is killed while rearing its young so that cruel or thoughtless women may wear its plumes.



BIRDS THAT SWIM AND CLIMB

AS we have so often seen, wherever there is food to be had, there Nature has placed the creatures best fitted to benefit by it. We have learned from the story of the sea birds what great numbers of feathered hunters live upon the products of the ocean; but there are many sorts of birds which owe their life to the food contained in the fresh water, in the rivers and lakes and marshes. Sea birds may come inland to feed in rivers and in fields, but many of these fresh-water birds never go to the sea for their food, any more than fresh-water fish go out into the briny ocean for theirs. Yet the difference between some of the fresh-water birds and some of the sea birds is not very great.

After studying the habits of the skilful cormorant, we should, if we saw a long-necked, long-beaked bird fishing in an African river, very likely exclaim, "There is a cormorant!" But a naturalist would at once point out the mistake. Our new friend has a very long neck, it is true, but it is thicker than that of the cormorant. Besides, its beak is sharper, and looks like a small spear; and that is just the purpose that it serves.

The bird is a darter, and, though its feet are webbed like a duck's, this bird builds in the trees of great forests, and hunts by night in the rivers and lakes and swamps near at hand.

CONTINUED FROM 1902



It is a splendid swimmer and diver, but does not rely upon its speed in swimming nor its ability to dive for getting its food. Experience has taught it that it is not safe to hunt by day, so it comes out when the sun is going down, and seeks its food in the gloom. Even this precaution is not enough. It does not like to expose itself on the water; it sinks its body beneath the surface, and glides along with its great wings partly open. Only part of its neck and beak are visible above the water. At the least sign of danger it sinks still lower, and only its bill is to be seen. Should danger still threaten, down the darter goes entirely under the water, to come up far away in a place where we least expect it.

But when all is quiet, the bird goes very cleverly to work. When it spies a fish, it makes a sudden dart with its closed beak, and drives this right through the body of the fish, fixing it as with a spear. Then the darter comes to the top of the water, and a wonderful formation of the bones of the neck enables it to give its head such a jerk that the fish is thrown off the beak to be eaten in comfort. In India the darter nests in company with cormorants, and, like these, can be tamed to travel with boatmen.

That trick of sinking under the water to escape detection is not known to the darters only. We may

see it perfectly carried out by the handsome little water-hens and coots. The water-hen's feet are thinly webbed; those of the coot are not, but each of its toes has a lobe of membrane on both sides, so that the same effect for swimming is gained. Water-hens, which we Americans call mud-hens, and the coots are common in Europe. They are to be found in most parks where there is water; but the greatest joy is to find them ourselves, wild, in their own homes.

A FAMILY OF COOTS IN A LITTLE STREAM IN ESSEX

Only a little while ago a lady and two gentlemen took a canoe up a small stream in Essex, quite near a good-sized town. The little river flows through the town and turns the wheels for a lot of machinery. Then it passes quietly along its bed, through a dense growth of trees and plants, and on into the open to turn the wheels of a water-mill. Now, so close were the trees that to get their little boat along our party had to cut their way through the branches that met across the stream, and they came upon a stretch of water as quiet and peaceful and beautiful as if it were a thousand miles from London. To their delight the friends, keeping very quiet, saw two or three big coots and their babies.

The friends paddled quietly along the stream to get a nearer view. The little coots scuttled into the bushes at the side of the stream, and hid, but their baby cries could be heard, like the cheeping of tiny ducklings. This greatly alarmed the mother of one of the broods. The father bird flew, beating the water with his wings and making a great chuckling in his fright. The mother bird stayed near to draw the visitors away from her babies. She swam away from where the nest was, dived under the overhanging root of a big tree, then disappeared as if a conjurer had held her.

HOW A MOTHER COOT HUNG IN THE WATER AND COLLECTED HER BABIES

Instead of a coot there remained to view only something like a little yellow leaf and a tiny red one, which seemed to have drifted into the water. That pink "leaf" and the yellow one were really the mother coot. She had sunk herself in the water under the root of the tree, and only her little yellow beak, with its small red crescent, remained above the

water. And there she hung in the water, as still as a mouse. The people in the boat drifted near enough to see the body of the bird deep down in the water, then they drew quietly and slowly away to a distance, and had the happiness of seeing her collect her babies together and sail off to her nest in the root of a tree growing down to the water's brim. Had she been seen on the land the brave little coot would not have had to hide; there she can run through the grass and reeds with the speed of a young deer. Water-hens and coots never do any damage. They eat insects and vegetation. But they have many enemies. Pike, the great hungry fish, often eat their young ones. And, of course, the men who call themselves sportsmen kill them as they kill everything that can swim, run, or fly.

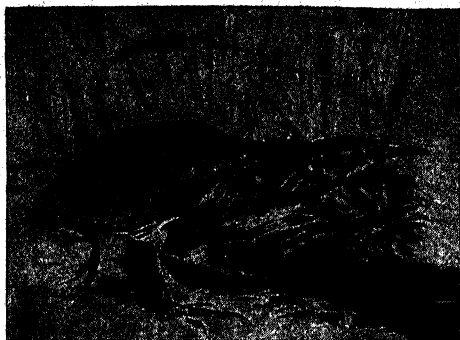
America, as well as the warmer parts of the Old World, has pelicans wherever there are extensive marshes. In Florida they dwell in great colonies on certain islands where they are safe; and in the Far West throng about the prairie ponds and marshes, and nest on the shore.

THE PELICAN & THE ADJUTANT, THE MOST COMICAL-LOOKING BIRDS IN THE WORLD

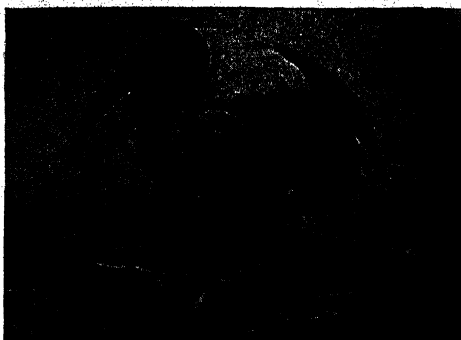
The pelicans and the adjutant birds are the most comical-looking creatures in the whole bird family. The pelican is as large as a swan, has white feathers tinged with red, while the breasts of the old ones are yellow. The breast feathers end in narrow points, and all the plumage is very coarse. But the remarkable point about the pelican is its beak. The upper mandible, or jaw, is long, large, and flat, and has a hook at the end, which curves over the lower jaw.

The lower jaw has attached to it a great pouch, which the pelican can make very small when empty, or so expand as to carry all the fish which it catches in the course of a hunt. This pouch is compared to a bag-net, and that is what it is—the pelican's bag-net. When the pelican goes into the water of a stream or lake, it catches all the fish it can, but does not swallow them; it simply carries them in the big pouch of the lower jaw. When it reaches the land it can eat the fish at its leisure. But more important is the fact that from this pouch the pelican can feed its young ones. The little pelicans pop their bills down the mother's mouth and take out as many fish as they need. Although so big and

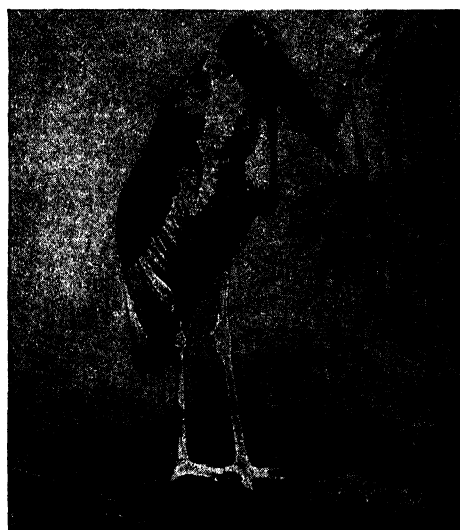
QUAINT BIRDS OF THE STORK FAMILY



This is the European bittern whose cry is like a deep boom. Our American bird is slightly different.



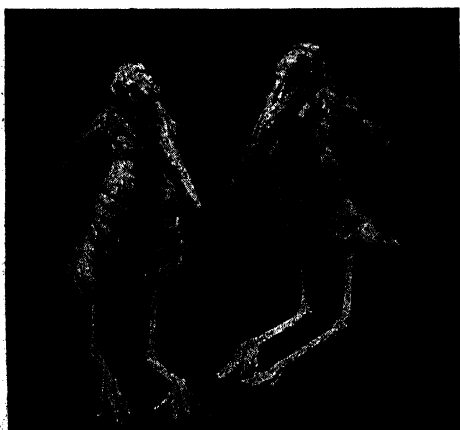
This is an ibis. Long ago ibises were very plentiful in Egypt, and the Egyptians used to worship them.



This adjutant stork looks like a comical soldier as he struts along with military stride, clapping his beak.



The white stork is a beautiful and intelligent bird, and loves to be near human beings who are kind to it.



The marabout stork is another species of adjutant. Here we see the curious position in which they sit to rest.



The boatbill does not look much like an adjutant, but, being a heron, it is related to all the storks.

awkward on the land, the pelican flies nobly, and the sight of thousands of these birds flying together is a picture never to be forgotten.

There is a whole family of large-billed birds which are famous as fliers. This is the great heron family, which has many members all over the world. They are birds with small bodies, from the size of a goose down to that of a young chicken or crow, and with very long, unfeathered legs upon which they can wade in the water, and long, curved, slender necks, with which they can reach down and snatch up a frog or lizard from the shore, or seize a fish swimming about their feet. They are usually dark blue or greenish, or pure white, and most of them have plume-ornaments about the head. The larger kinds are nowhere very common, since swamps have been so much drained in this country, and so many persons with guns are about, but the small blue and green herons are to be seen on every wood creek, and flying over every pond. Some persons confuse the heron with the crane, but that is a very different kind of wader.

THE HERON AND ITS STRANGE HABITS OF LIFE IN WATER AND IN TREES

In England some friends of the heron protect it, so that it may build in safety; but, since hawking went out of fashion, the heron has gone out of fashion, too. It was at one time the custom to fly hawks at herons, as we have already read; and it seems rather cruel that, now that the bird does not serve for sport, it should be no longer wanted. Of course, it has its faults. It eats a great number of fish in the rivers and lakes which it frequents. It eats the young of other birds, too, and that seems excuse enough to make every man with a gun its enemy. Nobody seems to take into account the value of its work as a destroyer of snakes and rats and mice.

Hérons are birds of singular habits. Half their lives are spent in the water, where, on their tall, stilt-like legs, they wade about looking for food, or calmly sleep, standing on one leg like a bird on a perch. Only at breeding time do many herons meet together. Then they make their nests at the top of tall trees. Where they are safe, herons return year after year to the same nests. In India herons

are tamed and kept about the houses. That, however, is not their only purpose. Natives practise horrible cruelty to the birds. They make them stand about on boats and on heaps of wood in the water. Wild birds, seeing them, come down to the same spot, thinking that what is safe for herons must be safe for them. The decoy birds stand as motionless as statues. The reason is that they cannot move—they have had their eyelids stitched up by the savages who own them.

THE BEAUTIFUL WHITE EGRET WHICH IS CRUELY SLAIN FOR FASHION'S SAKE

The largest heron is blue, with a black crest, but with white on the head, face, and breast. A heron which fishes by night is purple; but another heron, called, from its great size, the Goliath heron, has nearly all the colors of the rainbow scattered through its beautiful plumage.

A large but slender heron is pure white. This is the head of the family of egrets, a name made only too well known to us by cruel women who wear the plumes of the lovely little egret as trimming for their hats. We can understand how wicked it is to take these plumes when we know that the egret has them only at the time that it is laying its eggs and hatching them. Thus the poor birds are killed outright or left to die while the babies are in the nest, where they, too, must starve and die. The laws in the United States and Canada prevent the use of these plumes.

The purple heron is not the only night-bird of the family. There is one, a small one, called the night-heron, from the fact that it sleeps away the day and devotes all the night to searching for food. They are not too lazy to go out in the daytime when their young ones are hatched, but night work suffices at other times.

THE BITTERN WITH THE BOOMING VOICE

In the same line as this bird come the bitterns, birds with a booming voice, which are common in this country wherever large marshes abound. It is smaller than the true herons, and has a shorter beak. But that beak is a fine spear, and when the bird is attacked it uses this with great force, and can cause a serious wound. Not only does it thrust

hard with this spear; it can use its beak as quickly as a kiwi can use its horny feet.

The most curious of all the herons we leave to the last. This is the boatbill, a name given because of the extraordinary shape of this bird's great broad beak. It lives in South America, and, as may be guessed, uses its curious bill as a shovel. Of all this wader family, the most interesting, perhaps, is the European stork.

Never having seen any storks in England except in captivity, two Englishmen, when they went to Holland the other year, thought that they would have a chance of seeing these fine birds in all their glory. But they had not looked at their bird calendar. Storks are like time and tide—they wait for no man. The birds had flown before the Englishmen reached Holland—flown to their winter quarters in Africa.

It is a glorious sight to see them flying. Big as they are, and strange as it seems to see their huge legs trailing out behind them like stiff tails, the storks, like the cranes and herons, fly magnificently, high up, and at night. Astronomers watching the moon and stars through telescopes are surprised to see a swarm of these noble birds suddenly come into their field of vision, so high in the air that the human eye could not, in the darkness, detect them.

In the spring the birds come back to Holland and many other parts of Europe, and people know of their coming long before they can see them, because, although the eye cannot trace them, the clap-clap-clap which the birds make with their great beaks travels down to earth. They know where they are welcome. The French people do not like them, and kill them when they can, so only a few storks, and those the unwise ones, go there. But to Germany

and Holland and Denmark they go in swarms. The people put great boxes on their roofs for them, and there, year after year, the birds make their homes for the summer, laying their eggs and rearing their young. No other bird is fonder of its little ones than the stork, and that is why kind-hearted people are so good to them. Beautiful stories are told of the affectionate nature of the birds.

Once a female stork could not attend the great gathering at which the storks all muster before they take their flight to Africa. Her mate went, but she remained behind and spent the winter in Europe. In the spring her mate re-

turned, and they built their new nest in the old place and reared their young ones. The same thing happened that autumn. She stayed and he went, and returned again in the spring; and the next autumn away he went again. After he had been away alone for three years, he stayed with her, and for the next three winters they remained together far from sunny Africa. Then by some accident they were both killed, and it was discovered why the mother stork had not gone away with the father stork. She had been injured in such a way that she could



A STORK'S NEST IN A BUSY CITY

not make the long journey, and that was why he had in the end stayed with her.

While in Europe storks are perfectly at home. They depend largely for their food upon supplies from the streets and markets. They gobble up the waste from fish in the public markets, and are highly valued as scavengers in this way and for their use in destroying rats and mice and reptiles which would otherwise be a nuisance.

In India the stork that the natives most highly value is the quaint-looking adjutant, which, with its five feet of height and its wings measuring fourteen

feet or so across, is equally at home on land or in shallow water or in the air.

It eats waste food in the streets, which in that hot climate would speedily cause illness to human beings. The adjutant is far from a beauty, but it is such a friendly fellow that it is often tamed and kept about houses.

THE QUAIN-LOOKING STORK THAT CAN SWALLOW A LEG OF MUTTON

One gentleman in India had an adjutant which used to stand behind his chair at meal-times and take more than its rightful share of the food. The servants were instructed to keep a sharp look-out for Master Adjutant, but his huge beak was often too much for them, and once he seized and swallowed a whole fowl. As the adjutant can swallow a full-sized cat or a leg of mutton, naturally a chicken would only be a delicacy to him. Ugly as the adjutant is, he has a relative in the marabou stork which gives highly valuable feathers. The marabou is a native of Africa. One of the singular features of the adjutant is a queer pouch which hangs down from the base of its neck. It can be closed or expanded at will, and it is supposed to have something to do with the bird's breathing.

There is not a more famous stork than the ibis, which in Egypt is called the sacred ibis. In body it is not much bigger than a fowl, but its long, powerful legs, its big head and long, curved beak make it quite a big-sized bird. There are over twenty species of ibis, of which the greater number belong to the Old World, and the remainder to various warm parts of America. But it is of the sacred ibis that we generally think when the name is mentioned. It is not clear whether the bird used to go to Egypt voluntarily, or whether it was captured in another part of Africa, and taken there to breed in captivity.

THE IBIS, WHICH WANDERED FREELY IN PHARAOH'S FAMOUS TEMPLES

This is one explanation given by naturalists, but it seems hardly a likely one, for there were thousands upon thousands of these birds in old Egypt. The ancients worshipped the bird. They thought it was favored by their gods. Nobody was allowed to harm it. The ibis was protected and fed, and allowed to wander in the temples.

It is probable that the birds went there naturally. They would go when the Nile rose, for then there would be plenty of food for them. When the Nile went down, the birds would go away to other parts of the African continent. Now, when the Nile rises, the Egyptians are happy, for the waters bring fertility to the parched fields; without the rising of the river crops could not grow and men could not live. So they would think that the coming of the ibis and the rising of the river were events belonging to each other, and that, no doubt, is why the bird would gradually become regarded as sacred. When the Romans conquered Egypt, they found the land teeming with ibises, and carried many of them to Italy, where the birds bred and flourished. The ibis is now seen in Egypt only when the Nile is in flood.

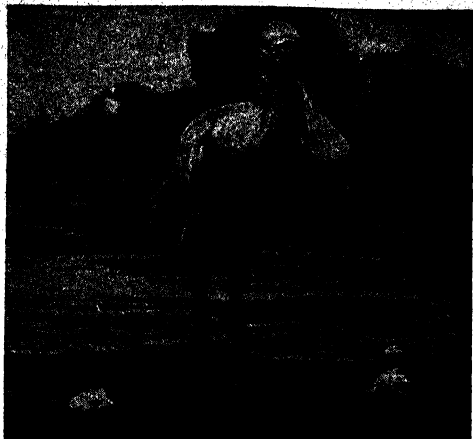
THE BIRD WITH A BILL LIKE A SPOON AND THE BIRD WITH A NEST LIKE A HOUSE

Nearly related to the ibis is the American spoonbill—a bird which can be recognized as a member of the family, but armed with a strange bill, broad like a spoon at the end. Another very remarkable stork is the African whale-head—a long-legged bird with a huge beak, which is among the shyest of the species. Not the least interesting is the hammerkop, which seems a connecting link between the storks and the herons. Its build resembles both birds, but it possesses a voice which neither a stork nor a heron has.

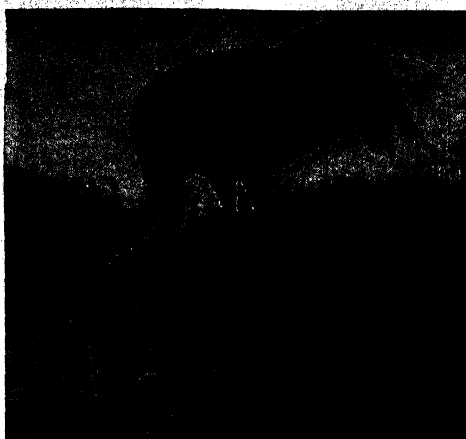
Its nest is a wonderful structure, built high in the fork of a great tree or in a cleft or rock. Like the lodge of a beaver it is built so strong that it will bear the weight of a man. It is divided inside into a sort of reception-hall and an assembly-room, while over these is the sleeping-chamber. When the young grow too big for the nest, they live in the larger room, and the hall serves for a look-out chamber. There is only one entrance, and that is made small and well hidden, and the birds have to creep in. This bird lives only in Africa and Madagascar, and is uncommon.

There are two types of birds which seem to come in between the cranes and storks. One is the seriema, a splendid South American bird, which some naturalists believe to be a sort of secretary bird. The other is the trumpeter, which looks like a very tall guinea-fowl.

CRANES & STORKS & THEIR RELATIONS



Here we have what looks like a big shoveler duck. It is the spoonbill heron, a near relative of the ibis.



Long ago we had swarms of cranes in many parts of our country, but now they are only seen in the far west.



The crowned crane is the handsomest of the family. The crown consists of a crest of bristle-like feathers, and gives the bird a striking appearance. These birds live in Africa, and collect in swarms as we see here, to strut and swagger, to spread out their strong, handsome wings and show their gay forms to their mates.



The seriema is a puzzle bird. Whether it is a sort of vulture, or a bustard, or a rail, men cannot quite agree. It lives in Brazil, the home of many beauties.



The hammerkop is supposed to be descended from the first parents of the storks. It builds a huge nest, strong enough to bear the weight of a man.

Its name suggests its special feature, which is its voice. Its peculiar wind-pipe enables it to utter a blast like a trumpet, lasting for a full minute. The Brazilians tame it, and it makes a splendid "watch-dog" for their poultry.

C RANES THAT DIE OF SORROW AND RAILS THAT RUN WITH MARVELOUS SPEED

The true cranes have an advantage over the storks and herons in that they have a powerful trumpet-like voice, and their loud calls may be heard as they sail on high through the air on their annual migrations. There are sixteen species of these birds, the handsomest being the gorgeous crowned cranes of Africa. The sarus crane of India is one of the most affectionate of birds; and if one of a pair dies, the other feels such sorrow that it pines away and dies.

It is believed that all the birds called rails descended from the same stock as the cranes. Most of the rails have long legs for running, and have run so well that many species have almost lost their powers of flying. We have read already of the weka rail of New Zealand. Our common sora rail is a relative of this bird. The corncrake is another bird whose harsh, rasping cry is heard in British grainfields. It runs with marvelous speed and lightness through the grain, and is very seldom seen, near though it appears by its voice to be.

One of the birds which used to be grouped with the storks and herons is the flamingo. It is a beautiful bird, with the slender neck and long legs of the family, and with a big curved beak which it turns upside down in the muddy water to act as a dredge. When its beak is full, it sifts away the mud and water, and feeds upon the insects in it.

F LAMINGOES THAT LOOK LIKE ISLANDS OF RED ROSES IN THE WATER

The Persians call the flamingo the red goose, and the bird really does belong more to the goose family than to the herons. Although it is a wading bird, the flamingo swims beautifully. To see it fly is one of the sights of a lifetime. As they stand in the water at rest, in flocks of thousands, the flamingoes look like huge rosy islands or masses of tinted snow, but when they rise into the air and expose their ruby wings, they look like gorgeous clouds floating in the sky.

The flamingo on its nest is a curiosity.

The nest is a high mound of mud, shaped like a basin. In this the bird deposits its eggs, and sits like a resting swan, with the neck gracefully coiled away among the back feathers, and the long legs doubled and showing far beyond the tail. Flamingoes are now very rare in Florida, but they are to be seen in vast swarms in Central America, and in various parts of the Old World.

Before passing from the wading birds, we must notice the curlews and whimbrels. These belong to a family of birds which we may see on the seashore in winter, and on the moors in summer. In the same family are the snipe, the sandpiper, the avocet, and stilt. The latter is practically a plover on stilts. The avocet is a similar bird, but its long, thin beak curls upward in startling fashion. The stilt resembles also another curious bird, the oyster-catcher, which has a long beak, so designed that the bird can easily take out an oyster from its shell. The beak of the curlew is like that of the avocet, but it curls downwards instead of upwards.

T HE JACANA BIRD THAT WALKS ON THE WATER-LILIES, AND THE CRUEL CUCKOO

A near ally is the jacana, which walks on the water, or, at any rate, on the broad leaves of the lilies growing in the water. To enable it to do this, it has the most remarkable feet in birddom. The toes are long and thin, like fine-drawn wire. There are ten species of these birds. One has a head like the water-hen. Another has long, streaming tail feathers, which makes us call it the water pheasant. At certain times we may see among the sandpipers birds much resembling them, which, however, are different. If we could closely watch them we should see a great change come over them. The males grow frills of feathers round their necks, and become like new birds. These are the ruffs; the females are the reeves.

Leaving the water birds and their relatives, we must now pass to some birds that climb. First comes the cuckoo, which we love for its beautiful musical "coo-coo," yet despise for its cruel habits. For every European cuckoo that grows up, four or five murders are committed.

The cuckoo reaches England about the end of April or the beginning of May,

THE BEAUTIES OF THE GOOSE FAMILY



These beautiful flamingoes really belong to the goose family, though the shape of the beak, the long legs, and the color of the rosy white plumage make the flamingo very unlike a goose. In India the flamingoes assemble in thousands, and, as they fly or wade or swim, look like clouds at sunset or floating islands all rosy in hue.



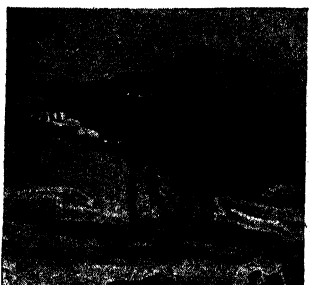
This curlew utters a piercing cry when disturbed in its marshy home. It eats insects, worms, and shellfish.



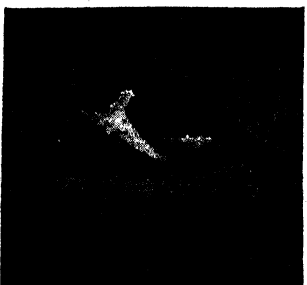
The stilted plover gets its name from its long, stilt-like legs. Several species are hunted by sportsmen.



Avocets are nearly related to stilted plovers, resembling them in habits. They have curious curved beaks.



Whimbrels are like curlews, and also leave marsh and moor for the coast where their winter food is.



Men require knives to open oysters, but this oyster-catcher bird opens them with its beak and eats them.



The ruff grows a fringe of feathers round its neck during love-making season. The female is called a reeve.

The picture of the crowned cranes on page 1977 is by Sir Harry Johnston, and the photographs are by W. P. Dando, Lewis Medland, Oliver Pike, R. B. Lodge, Underwood & Underwood, and Gambler Bolton, by permission of the Autotype Co.

and sings until the middle of June. It leaves for Africa again in August or September. In that time it must have its numerous brood reared. It is a big bird, almost as big as a sparrow-hawk, and other birds, notably the sparrows, regard it as a sparrow-hawk which has not the courage of one. They therefore persecute the cuckoo.

Now, if this sort of thing went on all through the summer, the cuckoo would never be able to collect food enough for its babies. This may be its excuse for its bad habit of laying its eggs in other birds' nests. The female lays an egg, then takes it in her mouth and flies to the nest of a hedge-sparrow, a water wagtail, a titlark, a yellow-hammer, a green linnet, a shrike, or a whinchat. While these are away, the mother cuckoo quietly pops its eggs into the nest and disappears. Sometimes she may knock out or even break some of the other eggs, but this is not the regular practice.

The little birds come back and hatch all the eggs, that of the cuckoo included, while the mother cuckoo lays six or seven more, and places each one in a different nest. Now, when the young cuckoo is hatched, it feels the other little birds in the nest. As it grows stronger, it is necessary for it to have more room and more food than the others. It would die if they remained in the nest. So, though it is a blind, naked thing, it commits murder. It gets the other little birds on its back, then, struggling up the side of the nest, it throws them over to die. Then it has the nest to itself. The mother bird does not notice the deception, or, if she does, probably she thinks it is an accident. She devotes all her time to feeding the young bird which has murdered her own children; and the cuckoo grows up big and hearty, and flies away to another country, to come back and itself place its eggs in other birds' nests. It is one of the most



THE CUCKOO

wonderful things in bird life. The baby cuckoo for the first fortnight has a deep curve in its back, so that it can the more surely raise the other little birds to the top of the nest and kill them. When it has done its wicked work, the young cuckoo loses this curve, and grows into a splendidly handsome bird.

There are many species of cuckoos which do not practise this trick, but hatch their own eggs. It is believed, however, that the American cuckoos are gradually taking to the same thing. One of its companions in evil is the American cowbird, the bird which eats the insects from the hides of cattle. This one lays its eggs in other birds' nests. The young do not throw the others out, but kill them by crushing them with their greater weight, or by snatching all the food which the

parent birds bring to the nest.

Among the climbers the name of the woodpecker must occur to all our minds. It possesses a beak as remarkable as that of the darter, but, instead of a spear, the woodpecker's is an axe, with which it cuts its way into the trunks of trees. It climbs along the trunk and branches of trees, and is able to tell in

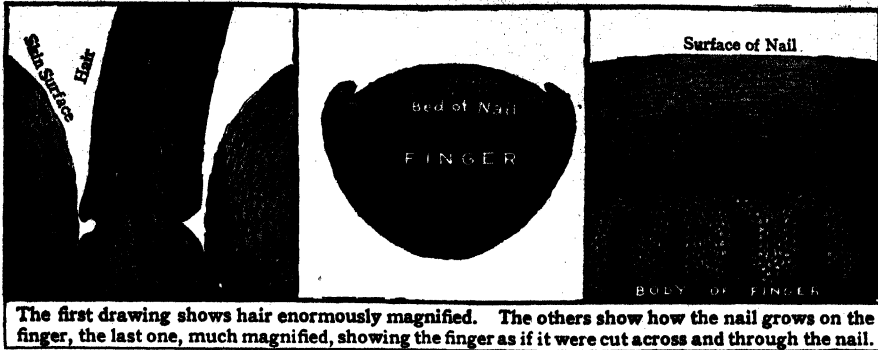


The Pileated Woodpecker
Courtesy Am. Mus. Nat. History.

an instant, by the tapping of its beak, if there are insects inside. Boring insects do great damage to trees; and the woodpecker is the only bird that can dig them out. It makes a hole with its sharp beak, then thrusts in its tongue and catches all that may be inside. If we had a few cuckoos and woodpeckers among our trees, they would keep the leaves free from caterpillars and the trees free from insect pests. The woodpecker bores his home in the trunk of the tree, and it is said that he does the same thing with telegraph poles, causing them to rot away. Many kinds of woodpeckers, large and small, are found in North America, and some of them are among our most beautiful birds.

THE NEXT STORIES OF BIRDS BEGIN ON 2105.

The Book of OUR OWN LIFE



THE HAIR AND THE NAILS

ON many parts of the body are special cells in the skin, with power of making certain outgrowths of skin which we all know very well. Our skin does not produce so many of these as does the skin of many animals, but at any rate it produces two kinds of outgrowth—hair and nails. Our nails are very interesting, for they correspond to the claws of a cat or a tiger, and also to the hoofs of a horse. A horse's hoof is really the nail of the middle finger or the middle toe; it has lost the other fingers and toes, or rather its ancestors lost them for it.

For many creatures, these outgrowths of the skin at the ends of their fingers and toes are extremely important. Perhaps they catch their prey by them, or else they walk upon them, or else they can climb by them. But in us these things have lost their importance, just as so many other parts of our bodies have lost their importance, because we have intelligence, by means of which we are able to do things for which animals require to use claws and teeth, and so on. Still, our nails remain, though they are too weak and thin to be of much use, but at least they have a very interesting history. They grow from below, and can be completely removed without destroying the cells which make them. If you play base-ball, or even if you do not, you may have had a nail banged. If it is

CONTINUED FROM 1924



banged hard, it turns blue. That means that a blood-vessel has been injured, and there has been some bleeding under the nail. In course of time the nail gets loose, and comes off, and then a new nail gradually forms underneath it. But if damage had been done to the special cells which have the power of making the nail, then no new nail could ever form again.

Perhaps you have noticed that sometimes the nails show white lines across them, or perhaps even little grooves. After an illness, these marks may appear on all our nails, and at just about the same height in each case. They mean that during the illness the blood was not quite well, and so the cells that make the nails did not do their work quite properly, and therefore these little flaws appear. Gradually they pass up to the tip of the nail, as it is pushed onwards, until at last they disappear. Anyone who notices this could guess that you had had an illness. I think this is one of the ways in which clever people sometimes pretend that they can tell you all about yourself by looking at your hands.

Hair is the other thing which our skin produces. The part of the hair that shows above the skin is really made of very much the same kind of material as the epidermis, or outer skin, which is also very much the

same as the material of which the nails are made. The hair has various uses. In a creature like the cat, it serves for warmth. Our own hair is so slight in quantity, except upon the head, that it has no use for this purpose. Indeed, our hair, like our nails, is mainly a sort of relic, reminding us of our likeness to the whole animal kingdom.

Almost the whole of the skin is covered with fine hairs, but there are none on the palms or soles, and I do not think you will ever find anyone who has a single hair growing on the last joint of any of his fingers. The most useful hair that we have in our bodies is certainly that which makes our eyebrows and eyelashes. We read on page 815 of the use of our eyebrows, and eyelashes have the same use, mainly to protect the eyes from dust, and also, I think, to make the eye look nice. Little hairs inside the nose are also useful to catch dust. No one is quite sure why hair grows on men's faces. It is of no use.

THE WONDERFUL WAY IN WHICH OUR HAIR IS MADE AND LOOKED AFTER

If we look at the fine hair on the arms, we notice that it runs in different directions in different parts. It has been noticed that these directions are the best for a creature sitting huddled up in the rain, for they would help the rain to run off the limbs. The hairs on the arms run to the elbow, and the hairs on the legs run away from the knee. But as we never sit in the wet, huddled up with no clothes on, this does not matter much to us. Still, it is interesting, just as it is interesting to remember that the valves in our veins are arranged as if we were meant to walk on our hands and feet.

Each hair grows from a special little place in the true skin. If the true skin is destroyed, a scar forms, and we may feel all right again; but nothing can ever form true skin again. A scar is not skin. There are never any hairs to be found growing from a scar, and when the rest of the body is dripping with sweat, a scar will be perfectly dry, for it never has any sweat-glands in it. The special little places from which the hairs grow are very complicated and beautifully made. Every hair really consists of six layers, all of which are made by the cells of the little hair-bulb from which the hair grows. But each hair requires

to be looked after, or it will become brittle, and will break off. So there are special glands—usually two to each hair—which produce a kind of oil that keeps the hair soft and pliable, and prevents it from cracking. Also, every hair has a muscle which is attached to its root, and when this tiny little muscle contracts, it pulls upon the hair and makes it stand upright. So when we read stories of people whose hair stood on end, it is quite possible that that really might happen, though it is not common.

HOW THE CAT MAKES ITS HAIR STAND ON END TO FRIGHTEN ITS ENEMIES

We scarcely ever use these little muscles, and no one can use them by his own will. Like the hairs themselves, they are relics from the past. A cat has them, and everyone who keeps a cat has seen its hair stand on end. A possible use of this is that it may help to clean the skin. But there is a more likely explanation still. When an animal like a cat makes all its hair stand on end, the cat looks much bigger and more alarming than when its hair lies flat. It is probable that this is of use to animals in helping them to frighten their enemies.

The hair of the head varies very much in different races of men. In most of us it is fairly straight and long; but the hair of a negro is quite different. It is very short and woolly, and if it is cut across and looked at under the microscope, we see that it has a different shape. These differences of shape serve to distinguish one race of men from another race much better than do differences of hair-color.

THE TEETH ARE SIMPLY OUTGROWTHS FROM THE SKIN

We shall not discuss the teeth here, though their turn will come, but it is interesting to know that they are really outgrowths of the skin, just as nails and hair are. The history of teeth begins with the fishes, and in them we can quite clearly see that the teeth are just a special row of skin projections that form round the edge of the mouth. In the development of each one of us the teeth are really formed from a sort of inturning of the skin that lines the mouth. All animals above the fishes have this development, with the exception of the birds. We know that the earliest birds had teeth, but no kind of bird alive to-day has teeth, although

THE HAIR AND THE NAILS

they have beaks instead. These also are really outgrowths from the skin.

In some of the lower animals the skin is a very important organ for breathing. It is so thin that the interchange of gases between the blood and the air, which goes on in our lungs, can actually go on through the surface, or almost the whole surface, of the body. This, for instance, is the case with the frog. We can scarcely breathe by our skin, however, though there seems to be just a little interchange of gases through the openings of the sweat-glands.

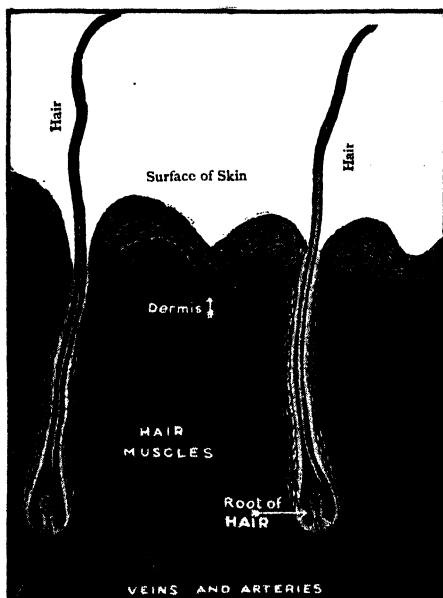
Though the skin is waterproof—so long as the outer skin, or epidermis, is uninjured—yet things dissolved in fat or oil can be rubbed into the skin through the openings of the sweat-glands. Various medicines can be taken in this way. Often children take cod-liver oil so, when it would upset their stomachs if they swallowed it. A poor, thin baby can be wonderfully fattened in this fashion. Another way of getting things through the skin is by the use of electricity, by means of which many drugs can be made to pass through it. Any part of the skin can be made very sensitive to cold, so that, if it is exposed to cold, the whole body may be disturbed in such a way as to make us ill. The way to do this is simply to cover the skin up. The thinnest and most delicate part of the whole skin is the skin of the face, but as we do not cover that up, we do not "catch cold," as the saying goes, by exposing it. As a rule, the skin of the hands is exposed, and so we do not catch cold when our hands become cold. Now, the skin of the feet, or, at any rate, the soles of the feet, is very thick and hard—the greatest contrast in the whole body to the skin of the face. But in this part of the world people always cover up their feet, and that is the way to

make the skin sensitive to cold. The consequence is that if our feet get wet we very often "catch cold."

That is simply because the feet have been covered up, as was pointed out by a great English writer on education, John Locke, more than 200 years ago. In some cities you may see children running about or standing in the cold and wet with bare feet; yet they come to no harm. This shows that as long as the skin is allowed to do its work for itself in a natural way we do not fall ill when the skin is chilled. It is only

when we cover the skin up and keep it warm—whether it wishes to be warm or not—that it loses the power of looking after itself. This is true of every part and every duty of the body. If a healthy man goes on crutches, his legs become weak. If a man's food is digested for him outside the body, his stomach loses the power of digestion for itself. If we take medicine every night to make us sleep, we soon become unable to sleep without medicine. If other people always do your thinking for you, you will become unable to think. If you protect your skin against cold, it becomes unable to protect itself. If you have short sight and use strong eyeglasses, your sight becomes shorter still.

This is a great, simple rule to which there are no exceptions, and yet we all forget it at times, though it is the greatest of all rules for the health of the body. We have our food prepared so that we do not need to use our teeth—some people even have the crust of toast cut off—and then we wonder why our teeth decay. Our elevators take us upstairs, and then we wonder why we get out of breath when they are not working and we have to walk. It is true of every part of the body, as it is true of the body as a whole, that *effort*



The roots of the hairs on our skin, greatly magnified. It is the tightening of the muscles of the hair, near the root, that makes it "stand on end."

is the law of life. There is a fine saying of one of the greatest men who ever lived, the Italian artist Leonardo da Vinci: "Thou, O God, hast given all good things to man at the price of labor." This applies to everything, even to the people who cannot stand sun or cold or fresh air because they coddle themselves up too much. They have taught their skin not to labor for itself, and have made it weak and helpless.

THE WONDERFUL LITTLE STRUCTURES THAT GIVE US THE SENSE OF TOUCH

But there still remain some most important facts about the skin of which we have said nothing. It is one of the great organs of sense or feeling. We are rather apt to confuse the various kinds of sensation that our skin gives us, as if they were all varieties of the same thing, but they are not. There is, first of all, the pressure sense, or sense of touch. This is quite different from the sense of pain, or of temperature.

If we examine the true skin—and especially if we examine it in the tips of the fingers and toes—we find special little structures in it which are there for the purpose of touch. Nerves run to them, and the ends of the nerves spread out within them. Wherever these little touch-bodies, as they are called, are most numerous, there our sense of touch is most delicate, and that is why so many of them are found in the tips of the fingers, where it is necessary that we should feel very delicately. Many of them are also found in the skin of the lips, and they also occur in the tip of the tongue. Two points can be felt as two by the skin of a forefinger, when they are very close together, but if the distance between them is increased by twenty times, we can only feel them as one when they are applied to the skin of the back. The skin of the forehead and of the palm of the hand will feel the lightest weight, while the skin of the chin requires the weight to be twenty times as heavy before it can be felt.

THE NERVES THAT GIVE US THE FEELING OF HEAT AND COLD

The sense of heat and cold is quite distinct from the sense of touch, and has a quite special set of nerves for itself. If you take a cold thing, like the tip of a lead pencil, and pass it over your

cheek, you will find that it feels colder at some spots than at others, and the same is true of anything hot. The skin seems to be made up of a host of little spots—pressure spots that are sensitive to pressure or touch, cold spots that are sensitive to cold, and do not feel heat at all, and hot spots that are sensitive to heat, and do not feel cold at all.

Finally, there is the pain sense. Different parts of the body are very differently sensitive to pain, and the skin is far more sensitive in general than the inside of the body. The pain sense has a special set of nerves of its own, and in some people, who have something the matter with these nerves so that the nerves cannot act, the skin of the hand will appreciate heat and cold and touch, but pins can be run into it, or it can be pinched, without any feeling of pain at all.

HOW THE SKIN PROBABLY HELPS US TO KNOW THE POSITION OF OUR BODY

So we must think of the skin as the organ for three senses—pressure, temperature, and pain—and not as the organ merely of one sense. People often say that we have five senses, but, as a matter of fact, the number of senses we possess is far more, and three of them must be put down to the credit of the skin alone. It is also probable that we are helped to know the position of our body—where our hands and feet are, and so on—by the amount of stretching of the skin in one part, or loosening of it in another part, which helps the brain to know where the different parts of the body are. So, in addition to everything else that it does, the skin contributes to our sense of position—one of the senses without which it would be exceedingly difficult to live, but about which great numbers of people have never heard anything.

On page 1165 a little has been said about the ridges on the fingers, which are very interesting. The lines in the palm of the hand are simply creases in the skin where it is folded upon itself. They have no other meaning, and it is very foolish to believe the people who pretend to tell the future by looking at these creases. More can be told about a man from the creases in his trousers than from the creases in the palm of his hand.

THE NEXT PART OF THIS IS ON PAGE 3077.



HOP-O'-MY-THUMB

A WOODCUTTER and his wife, who lived on the borders of a huge forest, had seven children. They were all boys, and the youngest of them was so tiny that his father called him Hop-o'-my-Thumb.

Once the woodcutter and his family had been well off, but the time came when things got so bad that the poor man began to wonder if he would always be able to find enough food for them to eat.

Now, although Hop-o'-my-Thumb was the youngest of them all, he was very shrewd and wide-awake, and he knew quite well what it was that made his father and mother so anxious.

One evening, as he lay awake in his little bed, he heard them talking in the parlor below.

"I cannot bear to see my children starve," his father was saying. "Tomorrow I shall take them out into the forest and leave them. Perhaps someone may find them and feed and care for them."

But the mother burst into tears.

"How can you be so cruel?" she sobbed. "If they are to die, better that they die here, where no greater harm can befall them."

But the father would not listen. He, too, loved his children dearly, but he could not bear to see them die before his eyes. And so the plans for the morrow were made.

Hop-o'-my-Thumb was very wide-

CONTINUED FROM 1913

awake indeed by this time, and before he went to sleep he, too, had made his plans.

Early in the morning, before even the birds were awake, he ran down to the brook, and filled his pockets with little white pebbles. Then he crept back to the house, took off his clothes, and jumped into bed again.

After breakfast their father told them they were to spend the day in the wood. The boys were delighted, and hurried off with shouts of laughter. But Hop-o'-my-Thumb managed to get behind the rest, and as he walked he carefully dropped his little pebbles all along the path.

Soon they came to a part of the forest where the trees grew thickly together. Here their father stopped, and set to work to cut down a tree. The little boys were told to tie up the faggots, and then, when they were too busy to miss him, the father stole quietly away. But it was not long before he was missed, and when they found themselves alone in the dense forest the boys were afraid.

But Hop-o'-my-Thumb smiled to himself.

"Have no fear," he said boldly. "Follow me, and I will lead you home."

Within a yard of where they stood was the last pebble that he had dropped; beyond it lay another—and another, and so, following the

stones, Hop-o'-my-Thumb led his brothers safely home.

While all this was happening, their mother sat at home, thinking sorrowfully that she had seen her boys for the last time. Presently there was a knock at the door, and in came a forester to say that his master, who had heard of their distress, had sent them a present of some venison. But before the poor woman could answer she heard shouts, the door burst open again, and in ran the seven little boys.

"Here we are, mother!" they cried. "We lost ourselves in the forest, but Hop-o'-my-Thumb brought us home without taking one wrong turning."

Their mother was overjoyed to see them again, and when their father came home in the evening, after having wandered about all day, too miserable to face his wife, a happier family than theirs was not to be found.

But the venison did not last for ever, and the day came when no food was left in the house but a loaf of bread. Hop-o'-my-Thumb knew this, and guessed what would happen. Sure enough that same evening he heard the woodcutter tell his wife that once more he must take the children into the forest, in the hope that somebody rich and generous might find them and give them a home.

At daybreak Hop-o'-my-Thumb sprang out of bed, and ran down the stairs, only to find, to his bitter disappointment, the door firmly barred and bolted. In despair, he turned and made his way slowly back to bed. But at breakfast an idea came to him. Instead of eating his slice of bread, he hid it in his coat, so that he might use the crumbs as he had used the pebbles to mark out the path.

Soon the father called the boys, and bade them go with him into the wood. Again, as before, he set them to a task, and then slipped away unnoticed.

The boys were not alarmed this time. "Hop-o'-my-Thumb knows the way," they said. But when Hop-o'-my-Thumb came to look for the crumbs that he had carefully strewn, there were none to be found! The birds had eaten them.

"Now we're in a pretty pickle," thought Hop-o'-my-Thumb. "Come, boys," he said aloud, "we can't stay here. It will soon be dark, and the wolves will be out."

They found a path and set out bravely.

Soon the sun went down, and the shadows began to fall. Presently one of the brothers ran on a little way ahead.

"I see a light," he shouted suddenly. "Look! There is a house. Let us beg a bed for the night."

They ran and knocked at the door. A woman with a kindly face opened it. But when she heard what they wanted she shook her head.

"Alas," said she, "my husband is an ogre. He will be returning soon, and if he finds you he will kill you and eat you."

The boys trembled.

"We dare not go out again into the dark forest," they said, weeping.

"Come in, you poor boys," said the woman, taking pity on them. "I will do my best for you till morning."

She hid them away in a garret and left them. Presently the ogre came home. He made such a dreadful noise coming up the steps that one of the brothers peeped out of the window to see what was the matter. The ogre glanced up with a look so terrible that the little boy drew back in terror—but not before he had been seen.

Up the stairs into the room strode the ogre. But it was dark, and he could see nothing. He struck a match, lit a lamp, and held it up. In the corner, all huddled together, he saw seven frightened little boys with white faces. One by one he pulled them out and looked them up and down.

"They will make a fine supper when they are fattened up a little," he said to his wife. "Give them a good meal and put them to bed. See that they have plenty to eat for a week, and by that time they ought to be fit to eat."

When the boys had had an excellent supper, they were taken into a room with two enormous beds. In one of these slept seven little ogresses, with seven gold crowns on their heads. Into the other crept the seven brothers. In the middle of the night the ogre woke up and began to feel sorry that he had not killed the boys on the spot. He got out of bed.

"What are you looking for?" asked his wife.

"My dagger," answered the ogre. "I'll make sure of those boys. Boys are slippery customers—they may escape."

Now, Hop-o'-my-Thumb, who had not closed his eyes all night, heard this.

As quick as lightning he jumped up, snatched up the golden crowns, and put them on his brothers' heads; then he carefully put the boys' nightcaps on the ogresses' heads and scrambled back into bed, just as the ogre came in. He went up to the bed where the seven little brothers lay, felt the golden crowns, and passed over to the other bed. Here he found seven little heads inside seven little nightcaps.

"Ah!" he said. And with one sweep of his dagger he slew them all.

Immediately he had gone, Hop-o'-my-Thumb woke up his brothers, and out

passing, and who promised to take them home, he made his way in fifty strides to the palace. In the palace gardens Hop-o'-my-Thumb was fortunate enough to find the king, surrounded by a group of courtiers, deep in conversation. Hop-o'-my-Thumb hid himself behind some trees and waited his opportunity. The discussion was a serious one. It appeared that the king was in despair that he could not get a message to his generals, who were fighting a great army miles away, in time to be of service. Unless this message could be delivered without delay it would be useless, and



HOP-O'-MY-THUMB GUIDED HIS BROTHERS SAFELY THROUGH THE WOOD

they all crept, just as the dawn was breaking. But before they could get very far away the ogre discovered what had happened.

"Bring me my seven-league boots!" he bellowed to his wife. With these boots he could go at a terrific speed. The boys saw him coming, and gave up all for lost. And, indeed, the ogre had nearly reached them, when his foot slipped, and he fell—right on to the huge dagger that he carried in his hand. The dagger ran into his heart, and with a groan he rolled over, dead.

Hop-o'-my-Thumb ran up to him, dragged off the seven-league boots, and put them on. Leaving his brothers in the care of some woodcutters who were

the enemy would conquer. Suddenly, to everyone's amazement, Hop-o'-my-Thumb stepped out from his hiding-place, showed the king his magic boots, and offered to carry the message faster than the swiftest horse. The courtiers were furious at his boldness, and would have thrust him out of the palace garden, but the king, who had taken a fancy to Hop-o'-my-Thumb, silenced them with a gesture, and gave his consent. Hop-o'-my-Thumb went, delivered his message, and returned in triumph.

From that day Hop-o'-my-Thumb's fortune was made, and he and his father and mother and his little brothers lived happily together ever after.

GERAINT AND ENID

A TALE OF KING ARTHUR'S COURT

ONE morning in early summer, Queen Guinevere, with a lady at her side, sat on her horse and waited on a hill to watch King Arthur's hunting of a deer.

While they stood there, Prince Geraint—a comely and vigorous young man—rode up the hill and drew rein at their side. He was too late for the hunt, so he stayed with the queen, and watched the woods in the distance and listened for the braying of the hounds.

Presently there passed by the hill, on the winding road in the valley, a strange company of three—a knight, a lady, and a dwarf, who lagged behind. They were all mounted, and rode slowly, the noise of their horses' hoofs on the soft earth scarce rising to the hilltop. The queen, puzzled to know the name of the knight, sent her lady after the dwarf to inquire.

But when the lady returned she had a red weal across her face, and indignantly she told how the arrogant dwarf had first refused to tell his master's name, and then, when the lady would have ridden past him, had cut her across the face with his whip. At this Geraint clapped spurs to his horse, and pursued the dwarf. But he, too, fared in the same manner. In his first rage, Geraint laid hand to his sword, meaning to cut down the dwarf, but his noble nature rebelled against striking so weak a creature. Therefore he rode back to the queen, obtained her permission to ride after the knight who kept so unmannerly a follower, and then, armed only with a sword, set off to demand an apology for the insult.

He saw the three riders far ahead of him disappear over the crown of a hill, and, following, discovered a little town in the valley below, into which they had disappeared. When the young prince arrived in this town, no one would give him lodging or lend him arms, or, indeed, take notice of him. The smithies rang with the sound of the hammering, there was a hurrying to and fro, and he learned that a great tourney was to be held on the morrow.

At last, however, an old earl, who lived in an almost ruined castle, received the young prince, and the daughter of this earl, Enid by name, took Geraint's horse to the stable and waited upon

him as he sat at meat. And Geraint loved her. She was fair, and the faded, simple dress she wore could not obscure the dignity and nobility of her soul. Much amazed to find this earl and the beautiful Enid living in poverty, Geraint told why he had come to the town, and the old earl, in return, told his story.

The knight whose dwarf had insulted him was called Sparrow-Hawk. He was a cruel and wicked man. He loved Enid, and because the earl would not give his beautiful daughter to so turbulent and bad a man, this Sparrow-Hawk had lied against the earl, had raised the town against him, and had even broken into his house and spoiled it of its once fair possessions. He had now built a castle in the town, and usurped all the privileges of the poor old earl.

Then Geraint craved leave to fight for Enid in the tourney, and the earl gave him leave, and Enid, who loved his noble face and quiet voice, was glad and happy. They found armor for him, and made it ready for the great tourney, and he rode into the lists and overthrew all who came against him. And when Sparrow-Hawk bit the dust before him, Geraint gave the bad knight his life on condition that he rode to Arthur's court and craved pardon of the queen for the insult done to her.

And now for Enid came the happy days of preparing for her marriage. She would have worn a glorious dress worthy of King Arthur's court, but Geraint, who loved her, with a man's delight in pure simplicity, begged her to wear the simple gown in which first he had seen her; and, thus dressed, she went with him to Caerleon.

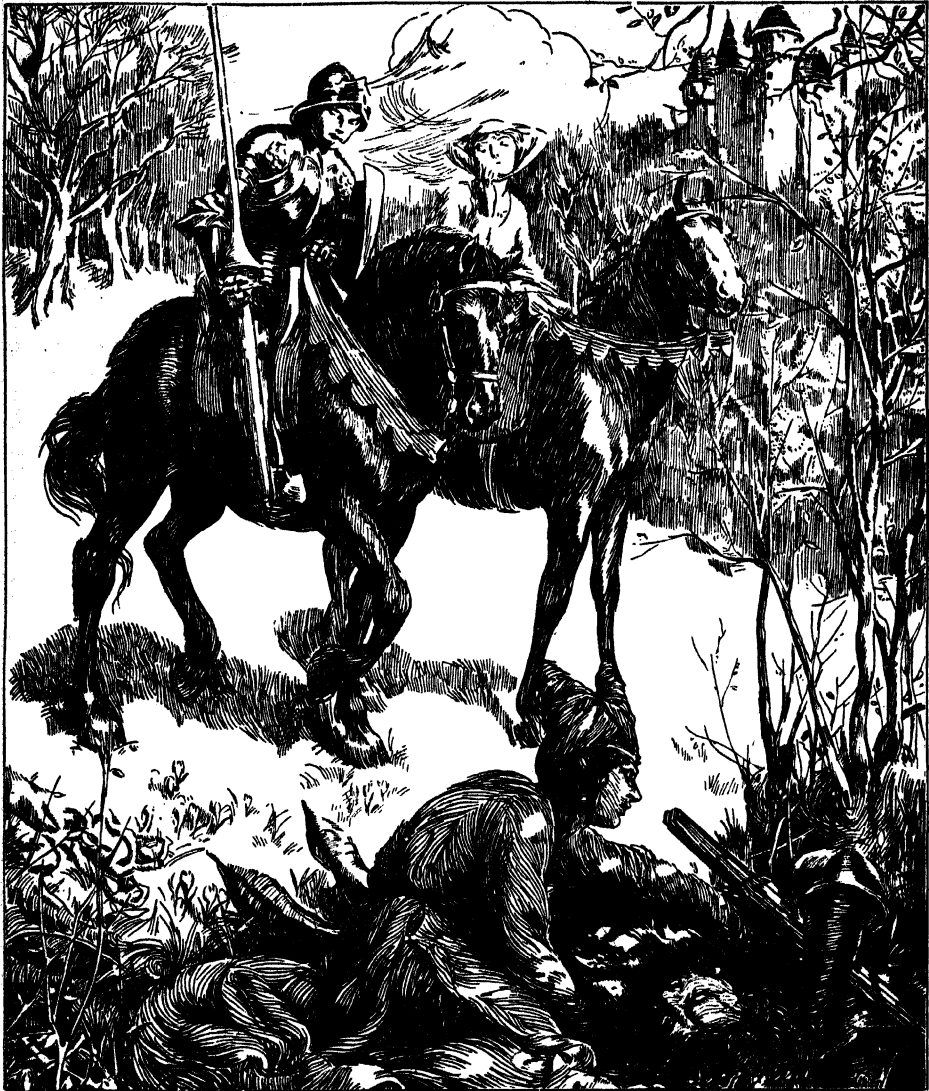
They were most happy on that ride, and full of play, like children; and when she said, "What will the queen think of my ragged dress?" the young prince kissed her fears away, and with brave words made her less afraid of entering King Arthur's court. And all loved Enid when she came among them, and the queen clothed her for the marriage in dresses royal and magnificent, and Geraint was proud of his little, beautiful, dear wife, who had grown to womanhood in poverty and simplicity.



AS THEY STOOD ON THE HILL. A KNIGHT, A LADY, AND A DWARF PASSED IN THE VALLEY

But soon after their marriage came those evil days when men said that Queen Guinevere loved Lancelot more than the king, and the air of the court seemed full of whispering and slander. The noble Prince Geraint, brooding on these tales, hated to see his young wife laughing among the other ladies at the court, and determined to take her away. So long did he brood about the matter that he began to wonder if she loved him best; it seemed to him that her eyes shone as brightly for others as for him-

self, and that she was as pleased to talk with the other knights as with her own husband. Thus did the noble heart of Prince Geraint become first suspicious, and afterwards bitter as gall. So he got permission of King Arthur to go to his own land, and there he dwelt with Enid, and gave himself up to loving her. But Enid, sorrowing that her brave lord had retired from his brave life, blamed herself, and one night, in her sleep, she cried aloud, "Oh, me, I fear that I am no true wife!" Geraint heard her, and



GERAINT AND ENID. RIDING THROUGH THE WILDS, CAME UPON A LADY WEeping

his soul staggered within him. He believed her false.

On the morrow he said roughly to her, "Put on your worst and meanest dress," and bade her get to horse, and ride on ahead of him; and, whatever might happen, she was not to speak to him. So Enid did his bidding, and wore the dress in which he had first loved her, whereat his heart grew sad. And thus they rode into the wilds.

And towards sunset Enid saw three tall knights waiting in ambush for her lord, and she rode back and told him. Geraint rebuked her for breaking silence,

and went forward. He overthrew the knights, stripped them of their armor, which he laid upon their horses, and then, knotting the reins of the horses together, bade Enid drive them before her.

Shortly afterwards Enid came upon a lady weeping over a knight who lay dead on the ground. She returned and told Geraint, and he rode up and said, "Lady, what has befallen you?"

"Noble knight," she replied, "as we rode through the forest three villains set upon my husband and slew him."

So Geraint rode on and overthrew the three false knights.

Then they came to a town and fell in with the great earl of all that territory, who had loved Enid years before. And this earl entreated her to leave Geraint, who treated her so pitifully, and to become his own proud wife, and dwell happily with wealth and honor. Enid, seeing that he would murder Geraint, promised and bade him come for her at dawn, but before the dawn she roused Geraint, told him the story, and they rode away. The earl and his followers pursued. Geraint slew the terrible earl and put his followers to flight.

But as they rode away Geraint suddenly swooned in his saddle and fell. Enid came back to him, and found him bleeding from an almost mortal wound. While she tended him, wailing because she thought him dead, the bandit Earl Doorm, with a great company, came charging by. The earl bade two of his men carry Geraint to his castle, and rode forward again. All day Geraint lay upon his shield in the castle of Doorm, his sword at his side, like a man dead. And at night a great feast was made in his castle.

It chanced that Earl Doorm, looking up from his eating and drinking, saw Enid sitting in shadow by the deathlike knight, and called her to his side.

"Eat!" he commanded.

"Not till my lord arises," said Enid.

"Drink!" cried Doorm.

"Not till my lord arises!" said Enid.

Then Doorm swore a great oath, and bade her think no more of a dead man. He offered to make her his wife, sent for gorgeous raiment, and told her she

should rule over his land. But Enid shook her head, and replied she loved one only. Doorm laughed scornfully, and pointed at her sorry dress, as though to say, "How well he loves you!" And Enid answered that in that very dress her lord had first looked upon her and loved her. Wroth to the full, the turbulent earl strode towards her and struck her a buffet on the cheek. But at that moment Geraint sprang, sword in hand, from the shield, and with one stroke "shore through the swarthy neck" of Doorm. At sight of the head rolling on the floor, and at sight of Geraint, risen, as it seemed, from the dead, the people fled terror-stricken from the hall, and they were left alone in a great silence.

Then Geraint looked upon Enid, and she came towards him open-armed. Very softly he craved forgiveness of his wife. He had heard her words to Earl Doorm. He knew her now for his true wife. All suspicion was swept from before his eyes. He saw her in all her gentle sweetness and truth. Nevermore would he think ill of her; nevermore would he doubt her. She could only answer with her arm and her lips.

At that same moment they became aware of a sudden stir without, and, expecting danger, went forth, to find King Arthur and his knights before the castle. The king had come to punish the wicked bandit earl, and Geraint found himself once more, happy and glad, among his friends. And Enid lived to be known by all people as Enid the Fair and Enid the Good, and Geraint loved her to the end of their days.

THE DOG AND THE WOLF

A LEAN, half-starved wolf happened one night to meet a dog who was well fed and looked happy. The wolf said:

"How well you are looking! I really never saw anyone looking so well. How is it that you are so well fed? I run into danger much more than you do, and yet I am almost starving."

"Why, you may live just as well as I do if you will do the same work."

"Indeed, what is that?" asked the wolf.

"Only to guard the house at night, and drive away thieves," answered the dog.

"That will just suit me," replied the wolf, "I shall be only too glad to ex-

change my rough life for plenty of food and a good roof over my head."

Then the wolf saw a mark round the dog's neck, and asked what it meant.

"Oh, that's nothing," said the dog. "But if you must know, my master ties me up in the daytime for fear that I should bite people, and I am only let loose at night."

"Thank you," replied the wolf. "You may keep your happiness to yourself. I would rather be free than be well fed under such conditions."

It is better to be poor and free than to be rich and a slave, says Æsop, the author of this fable.

THE LITTLE PRINCES IN THE TOWER

TOWARDS the end of the fifteenth century, a little cavalcade set out from Ludlow Castle for London, and the centre of this party was a handsome boy thirteen years of age. News of his father's death had reached the castle, and, as his father was Edward IV., King of England, the little boy set out as soon as possible, with the gentlemen about him, to claim his kingdom.

On the way the party was met by Richard, Duke of Gloucester, a small, misshapen man, with cunning, cruel eyes and a harsh tongue. This Duke of Gloucester was the younger brother of the dead king, and uncle of the handsome boy riding to claim his kingdom. He explained that he was Regent of England, because the new king was only a boy, and, accusing the gentlemen who rode with little Edward V. of treason, he had them arrested, and himself took charge of the boy-king.

The boy cried bitterly when his friends were taken from him, for he feared his ugly uncle, and hated to go with him to London. But the Duke of Gloucester pretended to be a kind uncle, and told the little king not to fear. He had him carried to the beautiful Tower of London, where the boy was to lodge until the affairs of his kingdom were settled. But when the door of the Tower closed upon him, the poor little boy-king knew that he was a prisoner.

The queen, when she heard what the Duke of Gloucester had done, fled in terror with her second son, whose name was Richard, to Westminster Abbey. She felt sure that some evil would befall her elder son, and determined to save her second son from the wickedness of the ugly uncle.

Now, this brutal man, Richard Duke of Gloucester, had the black heart of a murderer. The young princes, Edward in the Tower of London and Richard with his mother in Westminster Abbey, were not pretty boys in his eyes, but only hateful obstacles to his great ambition.

He wanted to be not Regent, but King of England. Between him and that ambition were the warm young bodies and the fresh young lives of these two pretty children. To slay those fair bodies and send those two innocent souls into

eternity became the master passion of this black-hearted man.

How did he accomplish this end?

He first sent a kind bishop to the queen in Westminster Abbey, saying that the little king in the Tower longed for his brother to play with him, and begged her that the boy might be sent thither. Most reluctantly the poor queen gave up her second son; and the two little brothers clasped each other in the Tower of London, and wondered what would become of them. They were both very frightened, very lonely, and very sorrowful.

Then the Duke of Gloucester spread the wicked lie that these young princes were not the sons of the dead king. He hoped that the people would cry out "Long live King Richard!" but there was no shout for this evil man. He cut off the heads of all those true noblemen who stood by the queen, and gathered about him a weak party who declared that he was the rightful king. People were actually paid to go about saying that the Duke of Gloucester should be king.

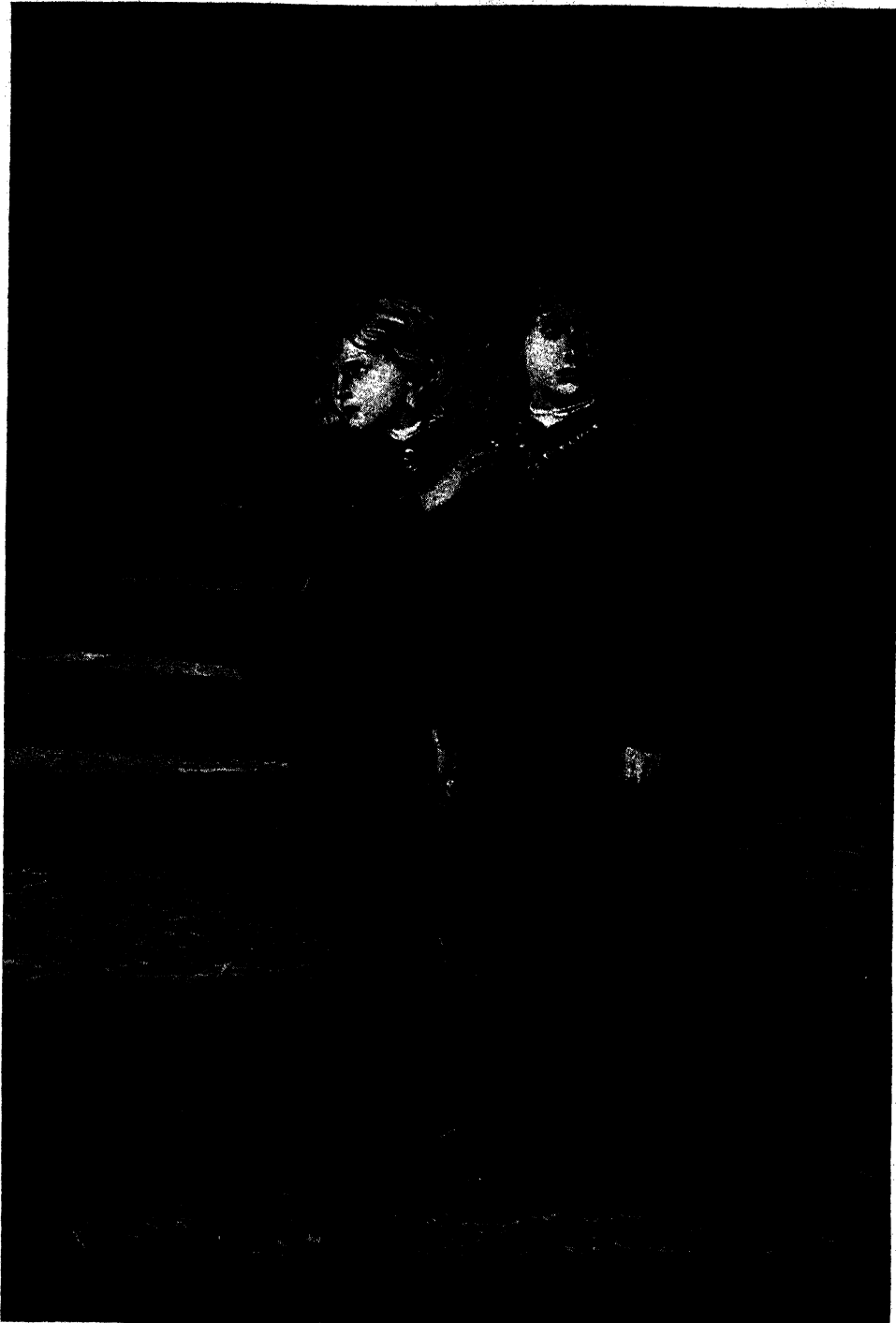
At last, in defiance of the whole nation, the duke was crowned King of England, while the true boy-king remained a prisoner in the Tower. If the nation had risen, as it should have risen, and had cried that Edward the Fifth was their king, Richard would have been saved one of the foulest deeds in history. He could not rest. He was the king. He was Richard III. He wore the crown. His word was absolute. His power none could dispute. But the little boys still lived.

He was troubled by the thought of those two poor, miserable children, shut up in the Tower, and frightened by their own shadows. They poisoned his happiness, and kept him jealous and afraid. While they lived he was a robber. He determined to be a murderer.

One day he could bear the thought no longer. He sent to the governor of the Tower, telling him that the princes were to be killed. The governor refused to execute this abominable command.

Then the king sent another messenger, bidding the governor deliver up the keys of the Tower for one night. This the governor was obliged to do.

TWO BOYS WHO WERE BORN TO BE KINGS



Terrified and lonely, yet closely guarded in the Tower of London, wandered these two boys over 400 years ago. One is Edward V., the rightful King of England, and the other is his younger brother, Richard, who would have followed him on the throne if he had lived. Their wicked uncle, the Duke of Gloucester, imprisoned them, and afterwards had them secretly murdered in order that he might become King Richard III.

That night two murderers approached the Tower, and opened the doors with the keys got by the king. They made a hole in the stone floor under the staircase, and then, sweating from their labor, ascended the stairs. They reached the door of the room where the young princes slept. They stood for a moment to gain their breath. Then, very quietly, they turned the key in the lock, and stole into the room on tiptoe. The only sound was the breathing of the sleepers.

The two beautiful prisoners lay in each other's arms on the big bed. Their curls lay spread upon the pillows. Their cheeks were flushed by troubled dreams. Their eyelashes were wet with tears. They had fallen asleep cuddled close together in that companionship of fear which possessed them every day, and still more in the dark hours of the night. Nothing could have been lovelier or more holy than the sight of those two sleeping children.

The murderers looked for a moment at the sleeping princes—one of them the rightful King of England—and then turned hastily away lest the beautiful sight of that pure and innocent sleep should rob even their hearts of energy

for this foul deed. Then they laid sudden hold upon the bed-clothes and the pillows, wrenched them off, and crammed them over the heads of the startled and awakening children.

As the poor children roused, the murderers pressed the weight of their bodies on the suffocating load, and forced the pillows hard against the mouths of the boys. A little cry; a convulsive struggle of the two poor little bodies; then a long and feeble twitching of the limbs—and the murderers felt, under the clothes, the bodies of their victims lie still for ever. The prisoners were set free. The hard-breathing murderers drew away the clothes, and saw that the princes were dead. They gathered in their arms the dead bodies, still warm with departed life, and carried them out of the room and down the stairs.

In the hole which they had dug they threw the bodies, and covered them with broken stones and earth, and trod the place flat. Then they went out of the Tower, and passed into the night, with the stars above their heads, and the Thames making music in their ears.

Richard the Third was king.

WHEN THE BLIND LED THE BLIND

HOW did the blind learn to read? A French writer, M. Dufall, has told the story.

A man named Valentine Haüy, who for a long time had thought how he could bring happiness to these unfortunate people, was one day walking through an out-of-the-way boulevard, when he came upon a blind beggar.

Touched by the helpless sorrow of the man, he put his hand in his pocket and gave him a piece of money. But he had hardly taken a step forward when the beggar, an honest man, called him back.

"Surely, sir," he said, "you have made a mistake; you have given me a franc instead of a sou."

The astonished giver asked the beggar how he had been able so quickly to detect the different value of the money.

"Oh," said the beggar, "it is enough for me to pass my finger over it."

This was like a flash of light.

"If the blind," thought Haüy, as he continued his walk, "can distinguish at the least touch a piece of money, why should they not distinguish by the same means a letter, a figure, a mark—in short, any sign whatever so long as it is raised?"

On this foundation he set to work, and presently invented a method for teaching the blind to read. His first pupil was a blind boy whom he rescued from begging at a church door. This boy learned with astonishing quickness to read by means of raised letters. Very soon Valentine Haüy was able to show his pupil in public, and the sight of a child reading with his fingers excited the greatest surprise and admiration.

When his method was perfected, he appealed to the public for funds to carry on his work, and, thanks to the subscriptions which came to him from all sides, Haüy was soon able to open the first institute for teaching the blind to read.

LEGENDS OF PLACES IN ENGLAND

THE CROCK OF GOLD IN THE PLAIN OF YORK

UPSALL CASTLE now lies in ruins on the Hambleton Hills overlooking the great plain of York. Some time ago a man who was living near the castle had a strange dream, three nights running, that if he went on foot to London Bridge and stood there waiting he would have some good news. So he took a wallet and a stick, and walked to London, and stood waiting on London Bridge until he was tired out. Just as he was going away a Quaker came up and asked him why he stood there.

"Because of something I dreamed," said the Yorkshireman.

"Oh, I don't believe in dreams!" said the Quaker. "Why, only last night I dreamed that there was a crock of gold buried under the elder-tree in the corner of Upsall Castle!" The Yorkshireman hurried back to Upsall, and began to dig under the elder-tree. There he found a pot full of copper coins. On the pot was written :

Look lower! Where this stood
Is another twice as good.

He dug lower, and discovered a chest full of silver, and on it was written :

Look lower! Where this stood
Is another twice as good.

So he still dug on, and found the gold.

THE FAIRY HORN NEAR GLOUCESTER

ONE hot summer day an outlandish knight set out from Gloucester, and lost his way in the great forest. He grew very weary and hungry, and, meeting a woodcutter, he asked him where he could get meat and drink. The woodcutter led him to a green mound, and said :

"If you will ascend this mound, and cry 'I thirst!' the fairy cup-bearer will appear." The knight did as he was told, and a cup-bearer, clad in a rich crimson dress, sprang out of the mound, bearing a large horn cup, set with gold and jewels, full of fairy wine. When the knight drank the nectar, all his thirst and weariness left him. The cup-bearer courteously waited for him to return the fairy horn. But the knight rudely rode away with it.

As soon as the Earl of Gloucester heard of this he pursued the knight, and slew him. The cup, presented by the earl to the King of England, was lost.

THE ENCHANTED CAVE OF RICHMOND HILL

MANY legends are told of the brave deeds of King Arthur and his knights, but in Yorkshire there is the legend of an enchanted cave beneath Richmond Castle, where the king and his knights are laid to rest. It has been seen but once—by a potter named Peter Thompson, who was one day wandering round the hill of Richmond Castle. He entered a ravine, at the end of which stood a huge boulder. Climbing over it, he saw a glimmer of light, and reached a lofty cavern glittering with crystal, spar, and stalactite. On a rocky couch lay King Arthur, clad in armor, with a jeweled crown upon his head, and a diamond-hilted sword beside him. Around him lay his knights asleep.

Peter Thompson drew the sword half out of its scabbard, but the sleeper showed signs of awaking, and he rushed in terror from the cave. As he went, a hollow cry came from within :

Potter, Potter Thompson,
If thou hadst either drawn the sword or blown
the horn,
Thou'dst been the luckiest man that ever yet
was born.

Terrified, he ran home. Many times he tried to find the cave again, but failed ; but they say the king and his knights still sleep beneath the Castle Hill.

THE PARSON AND HIS CLERK AT DAWLISH

A PARSON and his clerk were riding one stormy night toward the pretty village of Dawlish, on the Devon coast, and lost their way. It was the clerk's fault, and the parson said to him, "I'd rather have the Evil One for guide!"

A strange horseman at once appeared and offered to direct the lost travelers. Just before reaching Dawlish they passed a brilliantly-lighted mansion. The strange horseman invited them to enter, and provided them with a splendid breakfast. But when the parson and his clerk came out of the mansion and tried to ride away, their horses would not move. "The Evil One take the brutes!" said the parson.

"I will," replied the horseman, lashing the horses over the cliff into the sea, where their riders changed into two rocks, now called the Parson and his Clerk.

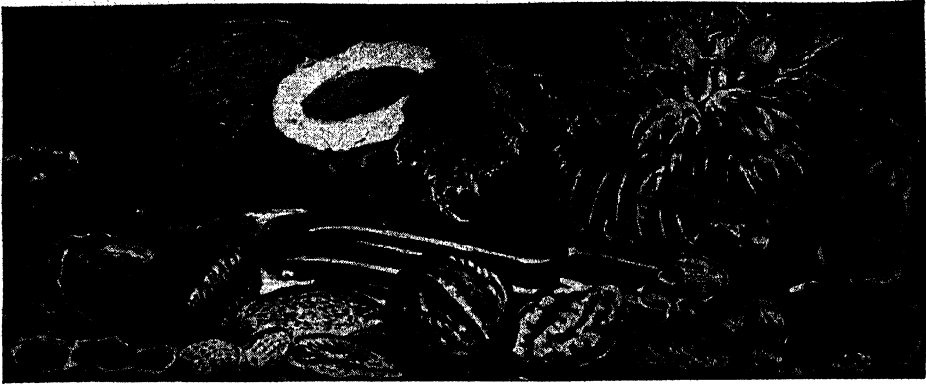
THE NEXT STORIES BEGIN ON PAGE 2059.

THE WALNUT IN ITS GREEN POD



These are thin-shelled walnuts, growing inside their green pods. When young the pods, with the unformed nuts inside, are made into pickles. The walnut tree is famous for its wood, which makes fine piano cases and furniture. Walnuts are important as food in Europe; here they are nothing more than dessert. The photographs on these pages are by Underwood & Underwood, London, Keystone View Company, H. Irving, J. E. Tyler, J. Valentine, and C. O. Pierce.

The Book of FAMILIAR THINGS



WHERE THE NUTS COME FROM

ALTHOUGH East-
ern America has
two species of hazel
nuts, the nuts of one kind
being wrapped in quaintly-fringed
round husks, and those of the other
enclosed in husks that are extended
into long tubes with fringed mouths,
the shrubs are seldom cultivated, and
never to the extent that they are in
Europe. Cobnuts or cobs, they are
called in England; or, when oblong
in shape, they are known as filberts.
We often see both kinds in our shops.

The hazel opens its flowers long
before the broad leaves expand; the
male flowers are those little catkins
which children call lambs' tails; the
female flower is the most modest little
bloom, and we can never find it
unless we look right at the tip of the
bud.

Although the tree is small, it is
valuable apart from its nuts. The
thin twigs make baskets; thicker
ones make hoops and stakes; while
the bigger timber, when burnt, makes
the best charcoal, which artists value
when it is made up for them into
crayons. The nuts themselves give
splendid oil, which is used in painting
pictures, and also in making costly
scents. The tree itself, as well as the
nuts, gives valuable oil, some of which
is said to relieve toothache.

Many of the edible nuts that come
pattering to the earth in Autumn, fall

CONTINUED FROM 1767

from great and pic-
turesque trees belong-
ing to the walnut
tribe. We may find in the
woods of various parts of the
country, as well as in the markets,
the pecan (grown for its fruit in
the southern states), the butternut,
a host of hickory nuts, and the black
walnut, with its hard, rough shell,
which has been perhaps more generally
planted than any other. But nearly
every farm has its shagbark hickory,
left to grow and scatter its thin-
shelled, sweet nuts for the farmer. It
can always be recognized by the long
strips of bark hanging like loose
shingles from their upper edges. The
walnut of Europe is common in our
shops, with its thin shell, and easily-
extracted meat. This tree has been
planted in California, and bears well
there. When young, the nuts re-
semble green, hard young pears.

In the Old World, the walnut is an
important form of food for poor
people. Enough walnuts are grown
there to supply quantities to manu-
facturers, who press out the rich oil
which the nut contains. Then they
sell the nut, squeezed into cakes, with
the oil gone, to poor people for food, or
to the farmers, who give it to their
cattle.

The wood of both walnut trees is
among the most valuable of all woods.
From it we make beautiful pianos and

cabinets and the stocks of guns. The bark and the green covering of the nut give a rich dark dye, which is used for the staining of woods that are of lighter color. The bruised leaves yield a pleasant balsam. The walnut tree reaches a height of nearly a hundred feet, and such a tree when cut down and sold for timber is worth \$3000.

One of the hardest nuts to crack, yet one of the nicest to eat, is the Brazil nut, which is grown in Brazil and other parts of tropical South America, and in French Guiana. It is a surprising growth. With such a hard shell, one would think that it does not need much protection. But the nuts grow in clusters, twenty or more packed together inside a great hard shell. The Brazil nut is the seed of the tree, and this hard shell encloses it, as the fruit of the peach encloses the hard stone. The outer shell in which the Brazil nut grows is the color of a cocoa-nut, and quite round. When the nut is ripe it falls to the ground. The tree grows to a height of over one hundred feet, so, as we may imagine, it is dangerous to walk under these trees when the nuts begin to fall.

Peanuts, which originally came from Brazil, grow on a small plant. The nuts, which push down into the ground and ripen there, contain a great deal of oil, and are very good food.

The most valuable of all nuts is the cocoa-nut. It grew first of all along the East Indian coast and the South Sea Islands, but it seemed as if Nature had given it almost animal powers. The nuts, when ripe, fall from the tree and into the sea, and go sailing off on the tide to distant lands. If there is enough soil for the nut, and the climate is warm in the land which it eventually reaches, it takes root in the soil and grows into a tree, which scatters its nuts on the ground or into the sea. Some will root there and form more trees; others will sail away to grow in other lands. In this way shipwrecked men find food and drink and lodging in uninhabited islands. It is a life-saver in the wilds.

The cocoa-nut grows on a palm tree, which has a stem about 18 inches round, and from 60 to 90 feet high. At the end of seven years the new tree begins to bear fruit, and it goes on bearing fruit for the next seventy or eighty years. The hard shell of the nut is enclosed in

a tough shell of fibre, from which the cocoa-nut matting is made. This double protection keeps out from the nut evil insects, like those which bore through the shell of the hazel.

The milk in the cocoa-nut is simply the juice of the palm tree's fruit. Other fruits, which are soft, have their juice distributed all through their system, but as the cocoa-nut grows, the kernel becomes hard and shrinks, and the milk, or juice, collects and becomes imprisoned in the centre.

Each big cocoa-nut tree gives from 80 to 200 nuts in the course of a year. The dried leaves of the tree, which are from 10 to 15 inches long, make thatch for the roofs of huts; the small leaves and fibres make screens, mats, baskets, and so forth.

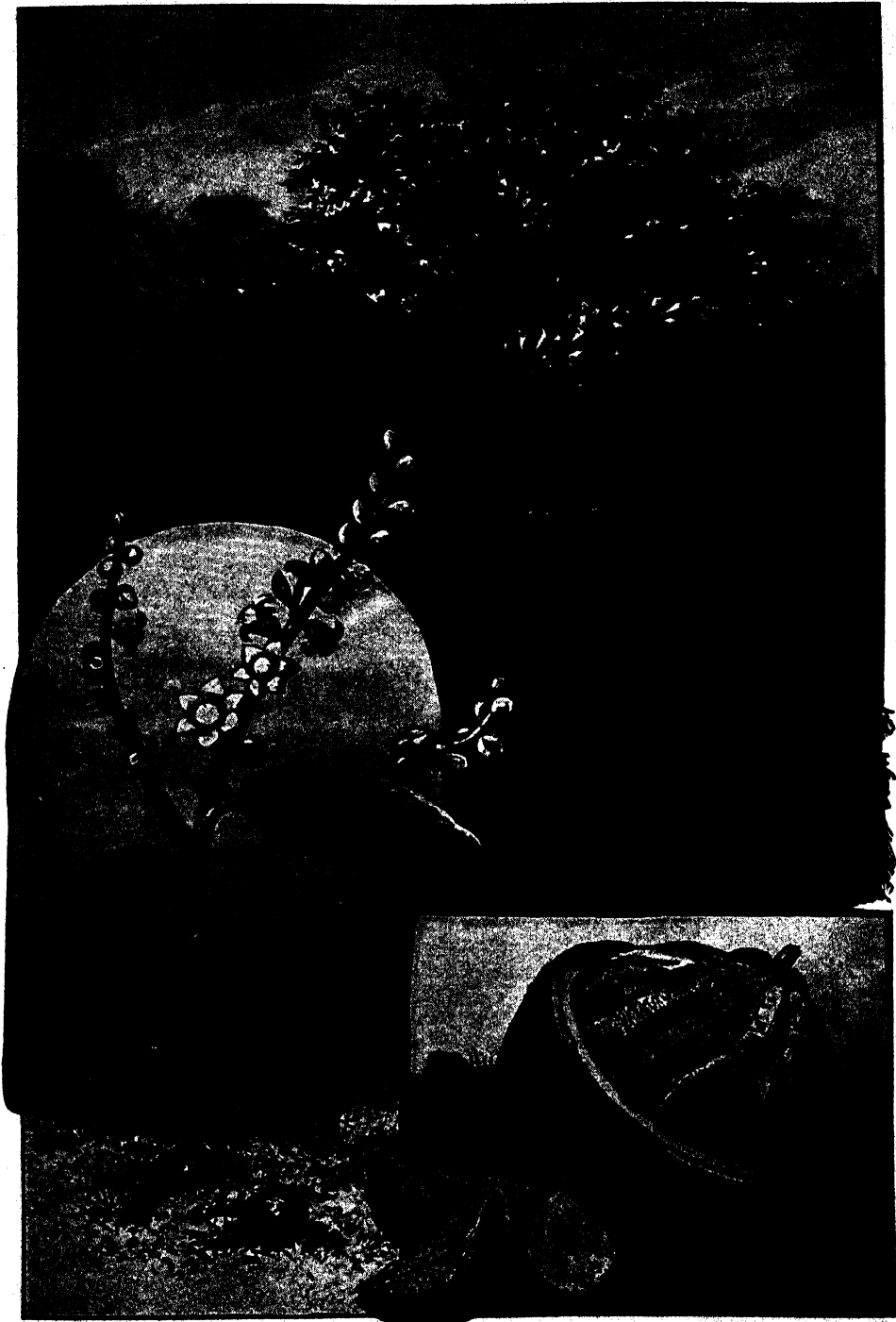
There is a big trade in cocoa-nuts, for they yield a valuable oil, which can be used in lamps, or for ointment, or even as medicine. It is valuable, too, for making soap which can be used at sea. Ordinary soap will not lather in salt water, but soap made from cocoa-nut oil will. From seven or eight cocoa-nuts about a quart of oil can be produced. The shell of the cocoa-nut can be carved and polished.

The large chestnuts which are often used for a sugary confection and are sold, raw or roasted, in our cities, come from the south of Europe. They grow in spiny husks, three nuts to a husk, like the common horse-chestnut, upon a fine handsome tree. Poor people in Europe roast the chestnut, or boil it like potatoes, and grind it for flour, to make into bread. Our own chestnuts are smaller, especially the chinquapins, but quite as sweet. Chestnut wood is easily split, has a handsome grain, and is used for railroad-ties, the interior of houses, furniture and the like.

The sweet almonds that we eat have been brought into existence by the care of men. At one time all almonds were bitter and poisonous. They grew first in Africa, but trees have been taken to Italy and other warm countries.

The almond is a relative of the peach tree, but, instead of enclosing its nut in fruit, it grows a husk, which gradually shrivels and opens up as the nut becomes ripe. The bitter almond gives excellent oil, and its wood is valuable to cabinet-makers.

THE NUTS OF WHICH MEN ARE AFRAID



The Brazil nut grows from a flower as an apple grows. The flower is the blossom of a tree 100 feet high. From that flower, seen here, a shell forms, and within it about fourteen nuts, each nut in its own shell. The outer covering of the nuts is as hard as rock, and when the nuts are ripe the great shells fall down like cannon-balls. Natives will not go near the tree when a wind blows, lest the falling nuts should kill them.

THE COCOA-NUT THAT PLANTS ITSELF



This cocoa-nut palm is a very valuable tree. It is from 60 to 90 feet in height, and for seventy years or more will give scores of nuts every year. Every part of the tree is valuable for some purpose or other.



These cocoa-nut trees, growing on a desert island, may have sprung from nuts which were washed ashore from other islands after having been tossed about for weeks in the sea.



The nuts, when ripe in their husks, fall to the ground or are pulled off by natives and stripped of their husk ready for sale.



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THE LITTLE BROWN HAZEL NUTS



The finest hazel nuts are grown in England, and the best are grown in Kent. There are two sorts, and these are the filberts. Maidstone is the centre of the hazel-nut country. Many more ought to be grown.

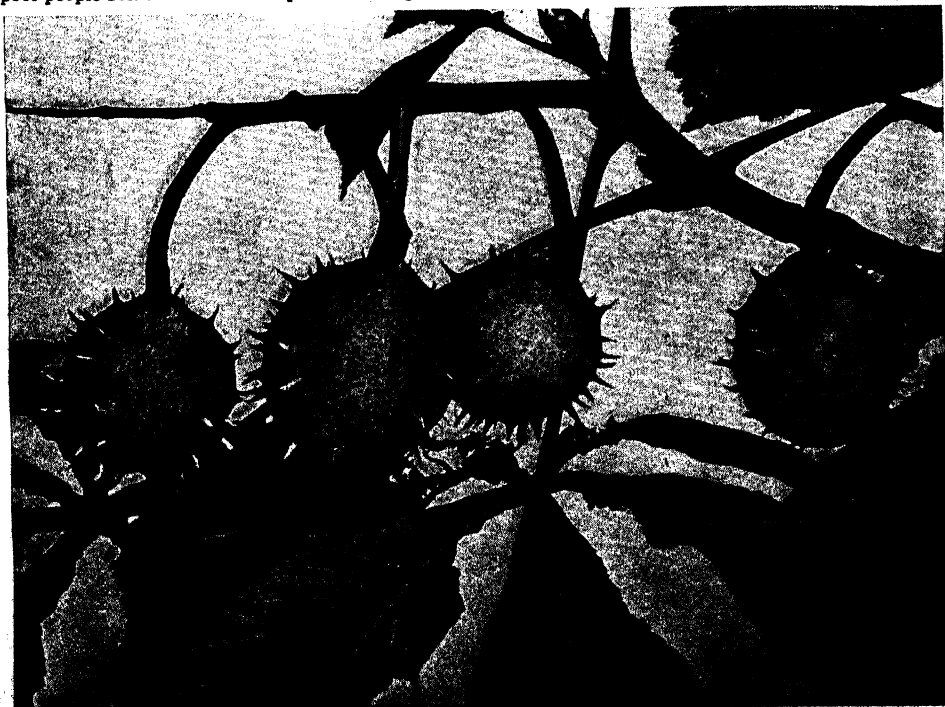


The Kent cob, shown here, is round instead of almond-shaped. The little brown nuts sold without husks are Spanish hazel nuts from Barcelona. Hazel nuts have an insect enemy which bores right through their shells.

THE TWO SORTS OF CHESTNUTS



Although we like chestnuts, they do not form an important article of food in this country, but in Europe poor people boil them as we boil potatoes and grind them for flour. The chestnut tree is valuable for timber.



The horse-chestnut, which every boy knows, cannot be eaten. It is rank and poisonous. But we have thousands of the trees, because they grow quickly. They have splendid foliage, and magnificent blooms.

TWO AMERICAN WALNUTS



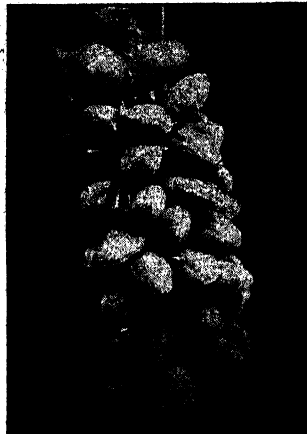
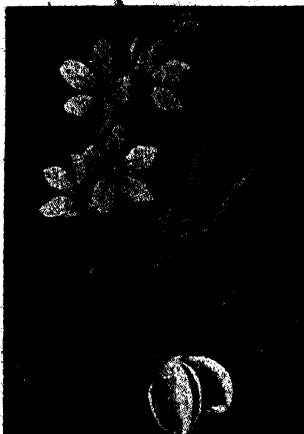
Fruit of the Black Walnut.



Photograph from New York Botanical Garden.

The black walnut, the fruit of which is shown above, and the white walnut, or butternut, shown below, are very closely related. The nuts of both are prized and the timber of both is valuable. Both are found chiefly in the eastern half of the United States though they have been very freely planted in the West.

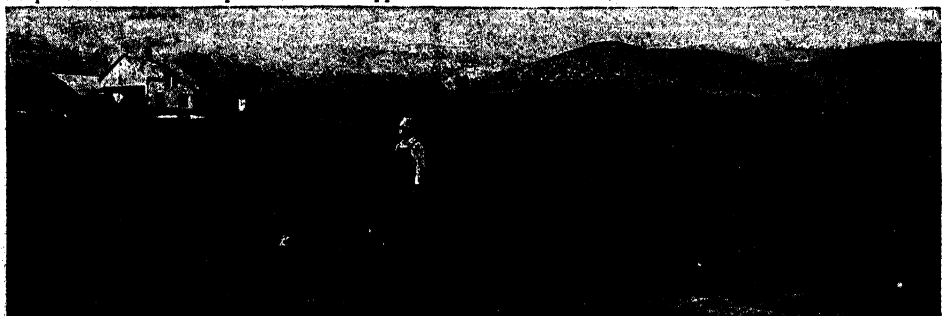
THE ALMOND FROM FLOWER TO NUT



Here we trace the almond from flower to nut. First comes the beautiful blossom. This falls away and a shell appears. This swells and hardens, and then we have the full-sized shell containing the nut.



This picture shows the sweet almond tree as it grows in southern California, where large quantities of nuts are produced. The tree presents a fine appearance when in bloom, with its beautiful pale pink flowers.



This almond grove is a triumph for skilful man. Once all almonds were bitter and poisonous, but by years of care and experiment men changed the nature of the nut and gave us the sweet almond which we now enjoy.

THE NEXT FAMILIAR THINGS BEGIN ON PAGE 2115.



WHY DO WE COUNT IN TENS?

YOU may well ask why we count in tens, for it would be much more convenient if we counted in twelves—if we had a *duodecimal* system of counting in twelves instead of a *decimal* system of counting in tens. I mean that we should invent two extra single figures for ten and eleven, and then write ten to mean twelve, and eleven to mean thirteen, 100 to mean 144 (twelve times twelve instead of ten times ten), and so on.

I believe we shall all do this some day; and the reason is that, while ten can only be evenly divided by two figures, two and five, twelve can be evenly divided by four figures. Thus, for many purposes it would be better to count in twelves, and, indeed, we often do so, as when we count twelve inches in a foot and twelve eggs in a dozen. This would also fit in nicely with the number of months in the year. But we count in tens still, as a rule, and we shall doubtless do so for many a long day yet, simply because our ancestors have always done so.

If you think how you sometimes used to reckon when you started arithmetic, you will guess the simple reason why. It is because we have

CONTINUED FROM 1886.



ten fingers. When we count on our fingers, as children do, and as the first men did, it is natural to make a fresh start after ten, because then we go back again to the finger we began with. So all over the world, and in all times and places, we find men counting by tens—using a decimal system, as we say—just because men and women everywhere have ten fingers.

WHY HAVE WE TEN FINGERS?

Nature decided on five fingers, or toes, at the end of each limb very long ago indeed—ages before man appeared upon the earth at all. It is true that, at first sight, there seem to be many exceptions to this. We find only one obvious finger, or toe, for each limb in the horse, two for the pig, and so on. But the original figure was five. The hen, for instance, has only three and a half toes, and when we examine the skeleton of its wing—which is really its arm—we find three and a half fingers there. The chicken, as we see it, is the same. But if we examine the hen's egg before the chicken is ready to break through the shell, we find that it has five fingers, or toes, on the end of each of its four limbs;

only the birds have apparently found that they could do as well with three and part of a fourth, so they have stopped developing the rest. We must go far below the mammals or the birds, or even the reptiles, for the beginnings of the five-fingered or five-toed arrangement, and it is not till we study the still humbler creatures that we get to the real beginning. If we look at a frog we can see that it has five fingers and five toes, just as we have. So we may say that it was the frog, or the remote ancestors of the frog, which decided ages ago that we should count in tens!

WHY ARE ALL OUR FINGERS NOT THE SAME LENGTH?

It might be very difficult to answer this question if we had only the present use of the hand to account for; and it is a disadvantage to us that our little fingers and ring-fingers, for instance, are so short and weak, for this weakens our grasp of things, which is the principal purpose for which we use our hands. Also, this inequality of the fingers in length and strength is a difficulty for the pianist and the typist. We therefore cannot hope to answer this question by referring to the usefulness of the hand for its present purpose. But we find the answer when we consider the history of the hand, and when we look at the fingers of many kinds of lower animals which have fingers more or less like ours.

We are told that hands were originally used for standing and for walking, and that they are like the fore feet of animals. If we put the hand on a table, as if we meant to walk on the tips of the fingers, I think we shall see at once what a well-balanced support it makes, just because the fingers are unequal in length—the middle finger the longest, and the short thumb and little finger falling behind and balancing the whole. We see the same thing at the zoological garden in the case of animals that have three fingers—as the toes of the forefeet might rightly be called—and we can notice it for ourselves any day in the dog or the cat. This is only one instance of a very large number furnished by our bodies which help us to understand why certain things, for which we can find no particular reason now, and which may even be inconvenient to us, are as they are.

WHY HAVE WE FINGER-NAILS AND TOE-NAILS?

Perhaps we may think that, at any rate, there is a use for finger-nails, as we can use them to scratch with when an insect has bitten us. But we do ourselves no good by scratching; and at the present day there is no explanation of finger-nails and toe-nails so far as use is concerned. If we turn to the past, however, we find the explanation at once. Our nails are in our own bodies like the things which the lower animals have and make great use of as claws and hoofs. We live by our minds, not by things like claws; and as we have not sufficient use for them, they have grown smaller and weaker in us—just as our teeth also have done, and our bones and muscles in large degree—until we have nothing left but nails.

Yet there is no doubt that they are really similar to the claws the cat uses for fighting and for climbing with, and for tearing its food; and the hoofs which the horse uses for walking upon. The ancestors of the horse had five fingers and toes, as we have, and a nail, or hoof, at the end of each; but all these except the middle ones have shrunk in the modern horse, until in him we find only one that reaches the ground, and the remains of another on each side. Occasionally we find a young horse born with three or even four toes. The horse's hoofs, then, are really the nails of its middle fingers and middle toes, and are very useful to it. They are made of the same material as our nails, and can be cut without pain, as our nails can.

WHY DOES A MOTH FLY ROUND AND ROUND A CANDLE?

No one can say what it is in the brain—or beginnings of a brain—of the moth that decides it to like the light; and it is quite clear to everyone that this liking does the moth no good—at any rate, in the case of such a light as the candle. It may possibly be that it benefits the moth, and other creatures that behave like it, to fly towards light from darkness; and perhaps we should find this to be so if we knew enough of the lives of these creatures. But much study has lately shown that animals and plants can be divided into those which go naturally from darkness to light, and those which go naturally from light to darkness. Learned names have been applied to

these habits—names which mean that the creature turns sunwards or away from the sun. Different plants and different parts of the same plant behave in similar ways; and if we notice the behavior of a baby towards a bright light we shall see that it is really like the moth. We find also that different creatures tend to move towards or away from other things besides light—such as heat, gravitation, electricity, and all sorts of chemicals and smells. Some grown-up people are like the moth—they move to the sunny side of the street; and others are like insects that usually live in darkness and fly towards it—they move to the shady side of the street.

WHY ARE SOME PEOPLE DARK AND SOME FAIR?

The differences of color between various people are a good instance of those many differences which are due not to anything that happens to us in the course of our lives, but to something that is inborn in us, and usually derived from our parents. The children of two dark parents are dark, those of parents who are both brown-eyed are always brown-eyed, and so on. This way in which people resemble their parents is one of the most important things in the world, and the special name for it is *heredity*. We say that the thing in question, such as skin-color or eye-color, is *hereditary*.

All human beings may be divided into races by their color—the fair-skinned, the yellow-skinned, and the dark-skinned; and they are all apt to think the others ugly when the differences are accompanied by others. In the United States there is a great mixture of races, though the majority belong to the dark-skinned family of mankind. Among us are a fairer and a darker race, and it is known that at present, owing to some reason we do not understand, the darker people are increasing and the fairer people becoming fewer. It is probable that, ages ago, differences in color depended partly on the amount of sun, darker people having coloring matter in skin and eyes which protects them from strong sunlight; but this is a question about which we do not know much yet.

WHY IS THE SKY DULL WHEN A STORM IS COMING ON?

The light of day is almost all due to the sun. The stars are shining, of course, as they do all the time, but they are so

far away that the light of all of them put together counts for nothing compared with the sun; nor does the light of the moon count for anything when it happens to be up during the day. Thus we may say that the light of day is due to direct sunlight and to skylight, which is sunlight reflected from the sky—that is to say, from the air. When a storm is coming on, clouds gather, and these clouds are thick and dense, so that they cut off the light of the sky, and so we say that the sky is dull. If we went up in a balloon above the clouds, we should find ourselves in brilliant sunshine, even when it was almost as dark as night to the people on the earth below.

WHERE DOES THE SPRING-WATER COME FROM?

Spring-water comes from the sky. If we live in the country, we soon find that the springs are dependent upon the rain, and when there is little rain, or none at all, the springs shrink, or may even dry up completely. This is true, even though the spring-water is seen coming from the earth. It is rain-water that has soaked into the earth, and then found its way to the surface again at the spring. And the spring-water runs at last into a lake or a river, and so to the sea, from which the sun sucks it up again, to send it down as rain. This goes on ceaselessly; and so the water of the spring has been round and round, in spring, sea, sky, and earth, countless thousands of times before we were born, and will be doing so hundreds of years after we are dead.

Spring-water is very good to drink, for it is very pure, it contains a lot of air dissolved in it which gives it a pleasant taste and sparkle, and it has dissolved into itself from the earth through which it has passed a number of different salts that are very good for us.

WHERE DO PLANTS GET THEIR SALTS FROM?

The salts of plants are necessary for their own lives, and are very valuable for us when we eat the plants, or when we eat other animals which eat the plants. There are very few salts in rain-water; but the rain-water, when it becomes what is called soil-water, melts, or dissolves, into itself everything that can be melted from the earth around it. Exactly what these salts are must depend, of course, upon the particular kind of soil, and this is very important, for some

plants require some salts and some require others ; so the quality of the soil in various places decides what kinds of plants can or cannot grow there. The plant gets all its water and all its salts by its roots ; and it can get no salts in the solid state, but only those that are dissolved in the soil-water. If we want certain plants to grow—such as grass or wheat, or even trees—we may often supply salts to the soil, so that they may be dissolved by the soil-water, and taken into the body of the plant.

WHY DOES WOOD ROT AWAY ?

Well, there are kinds of wood that will not rot away, even though they are kept in water. The ancient city of Venice is actually built on wooden piles buried in the shallow sea ; and these have lasted for many centuries already. This wood does not rot because the things that make wood rot cannot attack it, and wood does not rot without a cause.

We shall begin to guess what it is that makes wood rot when we learn what is done to wood that must be exposed to wet and yet must not rot—for instance, the wood of which railway sleepers are made. These are often soaked with a chemical substance called *creosote* ; and the particular property of creosote which makes it so valuable is that it is poisonous to microbes. So the answer to the question, in one word, is *microbes* ; and wood will not rot if it is charged with something that kills microbes, or if it is made of stuff so hard and tough that even microbes cannot digest it ; or if, as in the case of Venice, it is very good wood, and also protected from the kinds of microbes that can rot wood by being kept in salt water.

WHY WON'T A THIRD TOOTH GROW ?

When we are born we have, hidden in our gums, all our first, or *primary*, teeth. These twenty teeth are already completely formed in all their parts at birth, and only have to get through the gums in order to be seen. A baby gets its food by sucking and not by biting, and so it is really better that its teeth should be out of the way at first, below the gums. Still deeper in the gums, below each of the primary teeth, and also farther back in the jaw than the primary teeth extend, there are little groups of cells, called tooth-germs, which will some

day make the second set of teeth, usually called the *permanent* teeth, though they are often not as permanent as they might be. There are thirty-two sets of these little cells : and though none of them are teeth, or look in the least like teeth, they have in them the power of making teeth of the various kinds that we possess.

We should take very great care of the first teeth of children, brushing them, and having them filled if they decay, even though we know that they will fall out soon, because if they are neglected the tooth-germs underneath them are very apt to be injured, and when the new teeth come they will be irregular, or have thin, soft, crumbly outsides, which easily break away or decay. Now we see why a second tooth grows when the first falls out or is pulled out. But no third tooth will grow when a second tooth has been lost, because there is no other tooth-germ lying below the second tooth, as there is below the first tooth. Thus a third tooth cannot grow because there is nothing for it to grow from.

IF WE THROW UP A BALL & GO FORWARD WHY DOES THE BALL FALL AT OUR FEET ?

Of course, it all depends how we throw the ball. The question really means that we throw the ball straight upwards ; and yet, as we move forward, the ball does so too, so as to fall at our feet. This does not happen if we are standing still. If the ball has been truly thrown it returns as it fell ; and if we move forward as soon as it leaves the hand the ball will fall behind us.

But what you have noticed, I think, is that if we throw a ball straight upwards *as we run* it falls into our hands, even though we have gone on running. The answer is that the ball has shared the motion of our body. Though we have directed it straight upwards, yet it is moving forwards as well, since it was doing so when it started, *because we were*. Similarly, a ball shares the motion of the earth, and, if thrown up from a point that seems to be not moving, falls back to it ; though the point has really moved many miles before the ball returns, the ball has moved with the earth and the air, and falls back to the same spot, though ball, earth, and air have moved far from where they were at first. All this teaches us that the motion we notice is always *relative* to something else—that is to say, we compare it with

something else that does not move, or that we cannot see move. If the something else moves too, we notice nothing. You may notice this any time you are in a train. If you pass a train that is standing still, you notice that you are going quickly; but if another train is going side by side with yours at the same speed you appear to be standing still.

WHY DO ONIONS MAKE OUR EYES WATER?

Our eyes are really watering all the time—that is to say, we are producing tears that pass over the eyeball and keep it clean. That is why we wink—to carry the tears that appear under the upper lid over the surface of the eye. These tears escape into the nose, as we know. We say that our eyes water when the tears form so quickly that they cannot escape quickly enough, because then we see them water. Onions give off something to the air which excites the ends of the nerves of smell in the nose, and also excites the ends of the nerves of touch in the eyeball and eyelids, and so sends a message to the brain, telling the tear-glands to make tears quickly, and then we say that our eyes water. There is use in this, as there usually is in such things, for the rapid flow of tears helps to protect the eyelids and the eyeball from the stuff the onions give off. In people who, for some reason, cannot produce tears, such things as onions will make the eyes smart severely, because such people cannot protect themselves by making their eyes water.

HOW DOES THE MILK GET INTO COCOA-NUTS?

The stuff that we call the milk of cocoa-nuts is not milk, and has nothing about it at all like milk, except its appearance. It would be a puzzle, indeed, if real milk were found in cocoa-nuts, for milk is formed only by the milk-glands of certain animals, called mammals. If you tried to feed a baby on the milk of cocoa-nuts instead of real milk, you would very soon learn the great difference there may be between things that look the same. Only it would be a very wrong thing to do, for the baby would very soon die. Various plants besides the cocoa-nut produce fluids that look milky, and are often called milk, simply because they look like it; but no plant produces anything at all the same as real

milk. The milk of the cocoa-nut is simply a fluid formed by the tissue, or substance, of the nut, and so we need not ask how it gets there.

WHY ARE WE TAUGHT AT SCHOOL TO USE OUR RIGHT HAND AND NOT OUR LEFT?

Babies are born with a natural tendency to use one hand more than the other. In the greater number of cases this is the right hand; but in a few—perhaps about six in a hundred—it is the left. It is not worth while to train both hands equally for everything—for instance, for writing—as this would take too much time; and we could not become so clever with either hand if we were taught to use both equally for everything. Therefore it is quite right that, at school, naturally right-handed children should have most attention paid to the right hand; but it is a pity that we should not find out which of the children are naturally left-handed, and train the left hand especially in them.

The reason why people are naturally right- and left-handed depends on the brain. The left side of our brain controls the right side of our bodies, and the right side of the brain controls the left side of our bodies. Thus right-handed people are really left-brained, and left-handed people are really right-brained. If they knew it, they speak and write and read with the left side of their brains, while left-handed people do so with the right side of their brains. People have one side of the brain rather bigger than the other: right-handed people the left side of the brain, and left-handed people the right side. This seems to depend on the amount of blood the two sides of the brain get; and in most of us the left side gets rather more, and so it takes the lead.

WHY DOES A RIVER CURVE AND TWIST INSTEAD OF RUNNING STRAIGHT?

The course of a river-bed entirely depends on the lie of the land. If this changes in course of time, the course of the river will change. The water runs downwards to the sea, pulled by the earth's attraction as near as it can get to the centre of the earth. It must run just as a ball would run on an irregular surface. Thus, sometimes, where the earth falls evenly, like a tilted table, a river will run quite straight; but if there is a little hillock in the way the river will run round it.

When we notice the ordinary curves and twists in the course of a river, we may see no good reason for them, for all the land may look equally flat. But that is only because we cannot, with our unaided eyes, see accurately enough. If we use a special instrument to show us "how the land lies" at any point, we shall find that the river is really doing the only thing it can—running downwards all the time.

WHY DO THE BEDS OF RIVERS CHANGE?

The earth's crust is shrinking all the time, as the interior of the globe cools and shrinks beneath it. This means that the lie of the land changes from age to age, and one consequence of this—it has many and great consequences—is that often the water of a river finds that its steepest and quickest course to the sea is different from what it used to be, and so the river-bed changes; the old one is deserted by the waters, and a new one is formed.

But the water itself, as it flows, rubs and melts away the earth it flows over, and so grinds a deeper and ever deeper bed for itself. Thus it gets less and less likely to desert its old bed the longer it flows there. In many parts of the world we can see how water has hewn a path for itself, even through solid rock. The railway engineer wishes to avoid carrying his trains uphill, just as the river water wishes to avoid traveling uphill; and so the engineer often bores a tunnel, rather than make the trains run out of their course. Sometimes the river does the very same thing. A train cannot cut a tunnel for itself, but sometimes water can, and then we have a river running underground.

WHAT IS A VACUUM?

Vacuum is simply a Latin adjective meaning *empty*, and we have an English word, *vacuous*, which has the same meaning, and which we sometimes apply to the expression of a person's face when it seems to mean nothing—when it appears to be *empty* of meaning. In the study of Nature we often talk about a vacuum, meaning by that an empty space. It is always necessary to remember that there is really no such thing as empty space, for what we call the *ether* is everywhere.

But when we speak of a vacuum we are leaving the ether out of account, and are simply thinking of gases, such as the air. We take such a thing as a globe of glass, which cannot collapse when the air is sucked out of it—a paper bag would not do, for when we suck the air out of that the air-pressure outside it makes it collapse—and we attach a pump to it, so as to suck out of it all the air we can. When we have done so, we call the space inside the glass globe a vacuum. As a matter of fact, we can never get a real vacuum, but only a space which contains comparatively little air. Even if we have a perfect pump that cannot leak—and I am sure I do not know where to find such a pump—and even if we work it for a thousand years, each time sucking out some of the air that was in the globe, we shall *never* have a perfect vacuum; only what is called a very *high* vacuum.

WHY CANNOT WE MAKE A REAL VACUUM?

Now, you would think that, if only we went on long enough, we are bound to get a vacuum, but that is not so. Let us even suppose that, being lucky enough to have a very fine pump, every time we work it we suck out one half of the gas that is in the globe. After the first stroke we have got rid of half the air; after the second we have got rid of three-quarters; after the third, of seven-eighths; after the fourth, of fifteen-sixteenths. This looks like doing what we want very soon; but if you go on reckoning for yourself you will find that something is always left, and always must be left. At each stroke you get out less than at the last, and after each stroke there is still left half of what there was before it.

Trying to make a vacuum in this way is the same as if a man asked for a sum of money, say, 64 cents, and agrees to draw 32 cents at once, then 16 cents, then 8 cents, and so on. Each time he gets half of whatever remains to be paid. Very soon he has 63 cents, but not in a million years will he ever get the whole of that last cent.

No one has ever made, or ever will make, a perfect vacuum. There are other ways of trying to do so besides this way with an air-pump, but none of them is perfect, though they may be better than the air-pump way.

WHY IS IT EASIER TO SWIM IN SALT WATER THAN IN FRESH?

Swimming has two parts, really—one is to keep up in the water, and the other is to move along in it. The question really is: Why is it easier to keep up, or to float, in salt water than in fresh? The answer depends wholly on the heaviness of our bodies as compared with the heaviness of the water. Our bodies are more than three-fourths water, but most of the rest is heavier than water. The fat of our bodies is lighter than water, and so helps us to float.

Now, fresh water is less heavy than salt water, and so our bodies, though only a little heavier than it, tend to sink in it. Ordinary sea water is heavier than fresh water, because it contains a lot of salts melted in it, just as the water of our own bodies does; so we find it easier to float and swim in sea water. But in some parts of the world there is water that is much saltier than even sea water; this is the case, for instance, in the Dead Sea, and we have all heard of the Great Salt Lake in Utah. There is so much salt in the water of the Dead Sea that it is actually heavier, on the whole, than our bodies are, so you cannot sink in the Dead Sea! On the other hand, there are some liquids much lighter than water, and if a man were to fall into a lake of one of them he could not swim at all, however good a swimmer he was; his body would sink like a stone in such a light liquid.

WHY HAVE WE TO DEVELOP PHOTOGRAPHS IN A RED LIGHT?

We know that white light is really a mixture of light of all sorts of colors—red, yellow, green, blue, and so on. Some of these lights of various colors have one kind of power, and some another. For instance, red light has far more heating power than violet light, which has practically none at all, while red light will soon show its power on a thermometer. Now, the kind of light that has the power of causing chemical changes, which is the light we see specially by and the light we photograph by, is mainly violet light, or the violet part of white light. We can see, in a way, by red light; but red light has practically no influence on photographic plates. We may say that photographic plates cannot see red light, and so we can use red light to develop them by, without fearing that

the photograph of our faces or the walls of the room will be printed on the plates.

WHEN WATER GOES BAD, WHY DO COLORS COME OVER ITS SURFACE?

What happens when water "goes bad" is that various forms of life grow on its surface. Pure water alone will not support life; there must be some other things in the water, and perhaps a fatty or oily layer on the surface of it, before these things—mainly microbes—will grow. Their growth covers the surface of the water with very thin layers of matter from which the light is reflected to our eyes when we look at it. But it happens, as in many other cases, such as a soap-bubble or mother-of-pearl, that the light is partly broken up as it is reflected from these thin layers of stuff, or as it passes through them if we were to see the water from below; and so the colors are produced. The reason is that the waves of light, as they return, some from one layer of the surface, some from another, interfere with each other, and the proper name for this is the *interference of light*.

WHAT IS BEAUTY?

We call anything beautiful which gives us pleasure, and that depends as much upon ourselves as upon what is outside us. Perhaps the majority of people find the sea, for instance, most beautiful when it is blue, and specially love the blue Mediterranean, where the skies are clear and intensely blue, and so the sea is blue, too. Especially if someone has lived in Italy as a child, and has to live beside a grey sea when he is grown up, he will think that the grey sea is ugly, and that nothing can be so beautiful as the blue sea. But suppose a Scotsman who loved Scotland had to go and live in Italy. He might find the blue sea after a little while very uninteresting, and with too much of a glare in it, and only when he went home and saw the grey sea again would he find the sea beautiful. We are made in different ways, and grey may be just as beautiful as blue if you find the right persons to look at it, just as the cry of a baby may be found more sweet in someone's ears than the finest note of the finest singer that ever lived. Nothing is beautiful or ugly in itself, but "thinking makes it so."

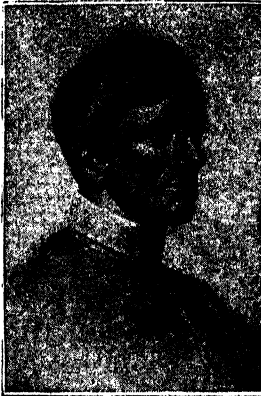
THE NEXT QUESTIONS ARE ON PAGE 2081.

BLIND MILTON



This is a picture of Milton, the great English poet and statesman of the seventeenth century. While in the prime of his life, Milton became blind. Here we see him dictating a hymn to one of his daughters. His three daughters were taught to pronounce Latin so that they could read aloud to him, but they were never taught the meaning of the words. In fact, the poet sadly neglected their education, with the result that they were not always the most dutiful of children, and often refused to attend to their father's needs.

The Book of MEN & WOMEN



CARDINAL NEWMAN AND HIS FAMOUS HYMN LEAD, KINDLY LIGHT

LEAD, kindly Light, amid the encircling
gloom,
Lead Thou me on;
The night is dark, and I am far from home,
Lead Thou me on.
Keep Thou my feet; I do not ask to see
The distant scene; one step enough for me.

I was not ever thus, nor prayed that Thou
Shouldst lead me on;
I loved to choose and see my path; but
now

Lead Thou me on;
I loved the garish day, and, spite of fears,
Pride ruled my will: remember not past
years.

So long Thy power hath blest me, sure it
still
Will lead me on,
O'er moor and fen, o'er crag and torrent, till
The night is gone;
And with the morn those angel faces smile,
Which I have loved long since, and lost
awhile.

THE WRITERS OF THE HYMNS

WHAT is a hymn? The word itself comes to us from the Greek, in which language it was *hymnos*, and meant a song, generally a song of praise. And that is what a hymn is, or should be, to-day, a song of praise and thanksgiving. Hymns have done more than most men's words in carrying comfort and joy to the hearts of people in sickness and sorrow, in doubt, danger, and anxiety. Many lives have been saved in scenes of peril when some brave soul has raised a voice to sing some sweet, simple hymn. The others have listened to the appeal and been comforted; they have gained confidence, and so been prevented from rushing into a panic in which they might all have perished. So the writers of hymns are very important people in the history of the world. Many of them are more important than they dream. One of our grand old hymns:

Let us, with a gladsome mind,
Praise the Lord, for He is kind,

was written by a boy! We have all sung it; millions of people have sung it during the last three hundred years. Yet how many of us have thought it was the work of a boy? It was written by John Milton, the great poet, when he was only

CONTINUED FROM 1866



fifteen, studying at St. Paul's School.

This hymn, though really old, seems almost young compared with some hymns sung every Sunday in every Christian land. The Jews sang hymns before Christ was born,

and we still sing hymns written in Greek or Latin by the saints. The hymn beginning "O Jesu, Lord of heavenly grace" was written by St. Ambrose, who lived his noble life fifteen centuries ago. A more famous hymn, "The day is past and over," is a translation from the Greek, in which it was written centuries ago by St. Anatolius. That grand hymn "Christian, dost thou see them?" was written far back in the ages by St. Andrew of Crete. We still sing three hymns by St. Bernard of Clairvaux, others by St. Gregory the Great, St. John Damascene, St. Joseph of the Studium, Francis Xavier, and many other holy men whose life stories have come down to us through the ages. "We plough the fields and scatter," the harvest hymn, is from an old German author. "All people that on earth do dwell" was written so long ago that we are not certain that William Kethe, its supposed author, really did write it. The tune comes from a book printed in 1554.

JULIUS CAESAR

HERBERT SPENCER

All hymn-books ought to print the names of the authors of the hymns. It is most interesting to know the name of the writer of some sacred song that we love. We think of the days and the place in which he wrote, and we understand the spirit in which he lifted up his heart. Take, for instance, that stirring hymn "Safe home, safe home in port," with Sir Arthur Sullivan's fine tune. We feel, as we sing the hymn, that these are the words of a man who lived in stirring times, and we are right, for the words are a translation from the Greek of St. Joseph of the Studium, who lived when Christianity was still struggling against the evil powers of the Roman Empire.

THE HYMNS THAT LED TO THE BIRTH OF THE PROTESTANT CHURCH

Martin Luther was a very great hymn-maker. He understood that the love of music, which the Jews had shown in their religious services, was not dead in men. He knew that to praise God in song was a natural desire of man, and he wrote hymns and chose tunes that would appeal to the heart and mind—tunes that were not so dull and unmusical as to be difficult and unpleasant to sing, nor yet of a character that would render them unfitting for religious services. "A mighty fortress is our God" is one of his best-known hymns.

The effect of Luther's hymns was marvelous. People wandered all over Europe singing them as they went. They were carried into the castle of the noble and into the cottage of the peasant. His hymns helped, even more, if that be possible, than his brave teaching, to free people from the beliefs in which they had up to then been held. Songs have always had great influence in exciting people to revolution as we see in the history of many countries.

JOHN WESLEY AND HIS BROTHER CHARLES, WHO WROTE OVER 6,000 HYMNS

There are hundreds of thousands of hymns in existence, printed in hundreds of different books, and millions of these books are sold every year.

We owe a great debt for our hymns to the Wesley brothers. John Wesley, the great founder of the Methodist Church, of whom we read in another part of this book, wrote many hymns and translated many more; but while John Wesley is famous for his preaching, it is Charles Wesley, his brother and disciple, who is

remembered by his hymns. It is not always easy to say which were John's hymns and which were Charles's, but we know that Charles wrote about 6,500 hymns. No other man ever had such a record as that. Of course, they are not all high-class poetry, but some of them are still among the noblest verses in the hymn-book. Take such of them as these: "Christ, whose glory fills the skies"; "Lo, He comes with clouds descending"; "Hark, the herald angels sing"; "The strife is o'er"; "Jesu, lover of my soul"; "O Love divine"—all the Christian world sings these. Charles was a great missionary, second only to his brother. He gave all his life to religious works, and refused a great fortune, because he did not think it right that the lady who proposed to leave it to him should forget her own family. He was born in 1707, and died when he was eighty-one.

DR. WATTS, THE INVALID SCHOOLMASTER WHOSE HYMNS WE ALL SING

In most hymn-books there are at least a dozen hymns by Dr. Isaac Watts. Many more might be included, and some others, not all so good, left out. He wrote over 500 hymns, among them such treasures as "When I survey the wondrous Cross"; "O God, our help in ages past"; "There is a land of pure delight"; and "Jesus shall reign where'er the sun." Watts was the son of a Southampton schoolmaster, and got his gift for poetry from his father. He became a tutor when he grew up, and then a minister, and received the degree of doctor of divinity from a Scottish university. He was taken ill when thirty-eight years old, and went for a rest to the home of Sir Thomas Abney at Theobalds, which he never left till he died, thirty-six years later.

A more recent writer of favorite hymns was Bishop William Walsham How, who was born in 1823 and died at the age of seventy-four. Among favorites from his pen are "Summer suns are glowing," "We give Thee but Thine own," and "Who is this so weak and helpless?" It is natural to find preachers among the hymn-writers, but the result is that some of the hymns they write are not sung by all congregations.

Christian people do not all believe quite the same things, and as some hymns express views of only one Church, such

THE WRITERS OF THE HYMNS

hymns are sung only in that Church. John Mason Neale, a scholar and true poet, wrote some of the most beautiful hymns, but they are not generally sung. Still, some of them are for all the world, such as "O love, how deep, how broad"; "For thee O dear, dear country"; "Jerusalem the golden"; and his translation from the Greek of "The day is past and over." Neale was a Church of England minister, very poor, but noble-hearted, though so extreme in his views that he got into trouble with his bishop and had to give up his pulpit.

"The day Thou gavest, Lord, is ended," yet not a word about his life is to be found in many of the great works which should tell us of such a man.

On the other hand, we know rather too much about Nahum Tate, the author of the immortal hymn "While shepherds watched their flocks by night." He lived in an age when it was not considered disgraceful to drink, and he was a drunkard. He was born the son of a Dublin clergyman, and became Poet Laureate of England. It is strange that such a man should have taken to writing



George Herbert, the poet and hymn-writer, in his garden at Bemerton: painted by William Dyce, R.A.

The authors of some of the finest poetry in the English language are unknown, and we have many fine hymns that cannot be traced to their writers. We have some written as they first appeared in English; we have some from unknown German and Italian authors, and nearly fifty from unknown Latin authors. Even where the name of the man is known, and his hymns are world-famous, sometimes no record of his life is preserved. In any good hymn-book are nearly fifty of John Ellerton's hymns, among them "Saviour, again to Thy dear Name we raise," and the beautiful

poetry on sacred subjects. Yet it is only by his sacred writings that he is remembered! Perhaps it was his better nature that appeared in his hymns. He had a partner named Nicholas Brady, and together they produced a version of the Psalms which was long sung in many churches.

We find a brighter picture in the life of Bishop Reginald Heber, a more gifted poet than Tate, and author of "From Greenland's icy mountains," "Holy, Holy, Holy," and "The Son of God goes forth to war." Heber was born in 1783, and after he had left Cambridge

University he had before him the chance of an easy life as a country clergyman. But he scorned such an existence. He preferred the perils and anxieties of mission work in India, and ended his days as Bishop of Calcutta, when only forty-three.

Another hymn-writer who died when forty-three was Sarah Flower Adams, born in 1805. She gave to the world the lovely hymn "Nearer, my God, to Thee." She was a beautiful woman, with a vivid imagination and fine powers as a writer. Once in her life she thought of going upon the stage, but happily she gave herself to nobler things, and devoted her powers to literature and works of religion. Another of the best of our hymns, "Our Blest Redeemer ere He breathed," was written by a woman, Harriet Auber. That was in 1823, since when it has been translated into every language belonging to Christian peoples.

THE WOMEN WRITERS OF SOME OF THE WORLD'S FAVORITE HYMNS

Two other favorites that have rung throughout the world, "There is a green hill far away" and "Once in royal David's city," are the work of a woman's heart and brain, Mrs. Cecil Frances Alexander, who was born in 1818, and married, when forty-two, the Archbishop of Armagh. She died in 1895. Frances Ridley Havergal, like Bishop Heber and Mrs. Adams, wrote many hymns which will long be sung; the most famous are "Thy life was given for me" and "Take my life and let it be." She had musical talent, and studied for some years in Germany, where she thought of making music, instead of writing, her chief aim in life. She was born at Astley rectory, Worcestershire, in 1836, and died in 1879.

For another of the most famous hymns, "Just as I am, without one plea," we owe thanks to Charlotte Elliott, a member of a clever family, who was born in 1789. As a young woman she gained some fame by writing comic verses, but then came an illness and serious thoughts. Afterwards she gave all her talent to writing beautiful verses on religious subjects, and her works did great good.

The Moody and Sankey hymns are sung by millions of people all over the

world. The book is not made up of hymns by the two revivalists. Sankey wrote the words of a few, and composed the music of many, but the bulk of the hymns are by other authors and composers.

THE STORY OF MOODY AND SANKEY AND THEIR FAMOUS HYMN-BOOK

They were two remarkable men. Dwight Lyman Moody was born in Massachusetts in 1837, and from early boyhood, until the age of seventeen, he labored on a farm. Then he became a clerk in a shoe-store. While in Chicago he spent much of his life in preaching to young men, and during our Civil War he acted as a missionary in the army.

When he was thirty-six he made the acquaintance of Ira David Sankey, a Pennsylvanian, three years younger than Moody. Sankey was the son of a banker, and in a better position than Moody had been; but he was an earnest Christian worker, who, though he could not preach like Moody, was a good singer and musician. The two men entered together on a mission. They preached all over America and visited England and Australia, and; though their methods seemed strange, they made a great impression and did great good by their services.

It was for these services that Sankey got together the famous Moody and Sankey hymn-book. The words of Sankey's own hymns have not the splendor of some others, but they reach the heart; and the tunes that he composed, though they are not so beautiful as many of the hymn-tunes which Sir Arthur Sullivan composed, are tunes which anybody with an ear for music can learn and remember.

THE BRAVE BLIND WOMAN WHO WROTE "SAFE IN THE ARMS OF JESUS"

Many of the hymns in "Sankey" bear the name "F. J. Crosby." The bearer of that name was a brave and cheerful blind woman. Frances Jane Crosby, a very noble woman, lost her sight as a baby, and never regained it. She received her education at a school for the blind, and devoted her life to making others good and happy. She wrote over three thousand hymns, of which one, "Safe in the arms of Jesus," has been sung all over the world.

THE WRITERS OF SOME FAMOUS HYMNS



MARTIN LUTHER
who wrote
"A sure stronghold is our God"



JOHN MILTON
who wrote, as a boy
"Let us with a gladsome mind"



BISHOP KEN
who wrote
"Glory to Thee, my God, this night"



ISAAC WATTS
who wrote 500 hymns, including
"O God, our help in ages past"



AUGUSTUS M. TOPLADY
who wrote
"Rock of ages, cleft for me"



JOHN WESLEY AND CHARLES WESLEY
the founders of Methodism,
who wrote many thousands of hymns still sung all over the world



WILLIAM COWPER
who wrote
"God moves in a mysterious way"



BISHOP HEBER
who wrote
"From Greenland's icy mountains"



JOHN KEBLE
who wrote
"Sun of my soul, Thou Saviour dear"



SIR JOHN BOWRING
who wrote
"In the Cross of Christ I glory"



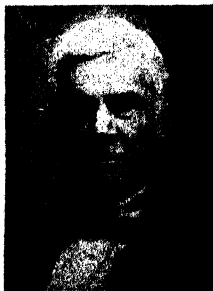
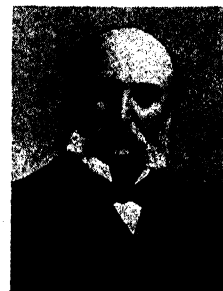
HENRY FRANCIS LYTE
who wrote
"Abide with me"



FRANCES HAVERGAL
who wrote
"Take my life, and let it be"



D. L. MOODY AND IRA D. SANKEY
the well-known American evangelists,
whose collection of hymns is used by religious assemblies everywhere



BISHOP HOW
who wrote
"Summer suns are glowing"

The photographs of Frances Ridley Havergal and Bishop How are by Elliott & Fry, and that of Ira D. Sankey by Russell

Everyone who reads in history the trial of the seven bishops, the brave men who refused to sacrifice their religious beliefs upon the order of a king, will sing with greater pleasure the fine old hymns "Awake, my soul, and with the sun," and "Glory to Thee, my God, this night," when they remember that the writer of them was William Ken, the famous bishop, who formed one of the valiant seven.

Ken had the advantage of studying the works of George Herbert, who wrote some of the finest religious poems in existence. He was born in 1593 and died at the age of forty. As a brother of Lord Herbert he hoped to win Court favor. Luckily he did not, but gave himself up to an earnest ministry in the Church, and to poetry. It is surprising that more of his hymns do not appear in the hymn-books. He died four years before Bishop Ken was born.

Many famous names appear among the hymns we may call modern. William Cowper, the poet, wrote "God moves in a mysterious way" and "Hark, my soul, it is the Lord." Sir Robert Grant, who was a great scholar, a Governor of Bombay, and for years a member of Parliament, wrote "O worship the King."

THE AMBASSADOR WHO WROTE A FAMOUS HYMN AND INVENTED THE FLORIN

Sir John Bowring wrote "In the Cross of Christ I glory." Bowring's life-story would make a good book. He was one of the most wonderful linguists that ever lived. He could speak a hundred languages, and read twice as many. He translated into English all the foreign songs and poems he could find. He traveled far and wide. He wanted to change the English money system into a simple one; and the two-shilling piece remains to-day to remind us of the work that he began. He invented the florin, and it remains one of their most convenient coins. But when acting as Ambassador, Bowring caused a war between China and England over quite a little matter.

The memory of James Drummond Burns, a Free Church minister, lives in the beautiful "Hushed was the evening hymn." He was a Scotsman, born in 1823, and he lived for some years in Madeira, and afterwards in London. "Rock of ages" serves to remind us of Augustus Montague Toplady, a clergy-

man who died more than a century ago; and the beautiful prayer for those in peril on the sea, "Eternal Father, strong to save," makes the name of William Whiting dear to us all.

Very few men receive such affectionate tributes as are paid to Henry Francis Lyte, an English clergyman, who has lain in his tomb at Nice since 1847.

THE EVENTIDE OF THE ENGLISH CLERGY-MAN WHO WROTE "ABIDE WITH ME"

Among the hymns that Mr. Lyte wrote was "Abide with me." He wrote it on the night that he preached his last sermon, thinking, not of that one night's repose, but of his eternal rest. Now we sing it at the close of evening service in church all over the world. Thousands of people have traveled to Nice as pilgrims to the grave of the man who wrote this hymn.

One of the hymns with a history is that most beautiful one "Lead, kindly Light." It was written by John Henry Newman while he was on the sea. He was a brilliant man in the Church of England, greatly beloved and admired for his beautiful character and his great gifts. But doubt came upon him, and it was while he doubted that he wrote this hymn. Afterwards he left the Protestant Church, and became, as a Roman Catholic, Cardinal Newman. At Oxford University, at the same time as Newman, was another gifted scholar and poet, John Keble, the author of "Sun of my soul," a hymn almost as famous as Newman's. Keble College, Oxford, is named after him.

"ALL HAIL THE POWER OF JESU'S NAME" AND "NOW THE DAY IS OVER"

In the same way the hymn "All hail the power of Jesu's name" keeps fresh the memory of Edward Perronet, though he has been dead more than a century. He was a friend of the Wesleys, and worked with them for a time.

Two very different hymns have been written by Mr. Baring-Gould, who is still among us. One is "Onward, Christian soldiers," a battle-hymn with a war-like spirit, which many people do not like; the other is "Now the day is over," a peaceful little lullaby hymn which children sing at the end of the day's play. Mr. Baring-Gould is a clergyman who has written many books.

THE NEXT STORIES OF MEN AND WOMEN BEGIN ON PAGE 2095.



HOW THE LION-HEART FORGAVE

RICHARD THE
LION-HEART

CONTINUED FROM 1958

is famed for his bravery in battle, for his dauntless courage and resource, and for his devotion to the cause of the Crusaders; but he showed that he was capable of something finer than mere physical bravery. He could forgive an enemy and act generously towards him.

His brother John did everything he could to injure Richard, and to take his place on the throne; yet when his mother interceded for John, Richard forgave him. Little wonder that a man of such frank, generous nature was adored by his soldiers, and won the chivalrous esteem of his enemy, Saladin the Saracen.

Perhaps Richard Lion-Heart's readiness to forgive is most clearly shown in the treatment of the rebel who gave him his death-wound. Vidomar, Viscount of Limoges, had found a treasure on his land, but would not give up a portion to Richard, who, as his lord, could claim it. So Richard went to besiege the Castle of Chaluz, where Vidomar lived. There, while Richard was one day riding round the walls to see where there was the most likelihood of making a breach in them, a young man, Bertrand de Gurdun, standing on the ramparts, recognised him, and shot an arrow, which struck the king's shoulder. The wound was a slight

one, but it was treated badly, and in the end was to prove mortal.

The castle was taken, and then Bertrand de Gurdun was found and brought to Richard's bedside.

"Wretch," said the king, "what harm did I do thee, that thou shouldest seek to take my life?"

"With your own hand you killed my father and my two brothers," was the reply. "Take what revenge you choose. I will endure the greatest torment so that you, who have wrought so many evils in the world, meet with your death."

But Richard would not hurt the young man, and said gently: "I forgive thee." Then, turning to his attendants, as shown in the picture, he added: "Loose his chains, and give him a present of a hundred shillings."

Yet the young man only scowled and demanded the sword, refusing to take advantage of the king's clemency.

"Live on by my bounty," whispered the dying king.

But Gurdun never regained his freedom, as Richard's attendants had no pity on him, and soon after he was put to death.

For all that, Richard's mercy to his assassin shows how a brave soldier was also pitiful and forgiving.

A FRUGAL HERO OF ANCIENT ROME

ROME became a great power because her citizens were honest, single-minded men who worked hard, loved their country, governed it wisely and fought for it bravely. In its early days the little state was surrounded by enemies, and men would be called from their farms outside the city to defend it

among the rugged Apennines. He won the esteem of his fellow-countrymen so that they three times elected him consul, or a ruler of the state, and twice gave him a triumph—a great honor for a Roman.

But when the fighting was over, Dentatus would go back to his farm, and work there with his own laborers in the fields until his country called for him again; for he was a man of sturdy, self-respecting character, living a simple country life, for whom luxury and ease had no attraction.

It is said that the Samnites once sent messengers to him with valuable presents of gold in the hope of bribing him over to their side. They found him seated in a field cooking a meal of turnips in an earthen pan. When Dentatus saw the gold, he refused it with contemptuous laughter, saying he wished to command those who lived in plenty while he himself continued in poverty, and that he was neither to be overcome in battle nor bribed by money. So the Samnites, shamefaced, had to take back the presents they had brought.



CURIUS DENTATUS REFUSING A BRIBE IN ROME

against the Volscians, Samnites, and other peoples.

One of the bravest of these early Romans was the farmer-statesman Curius Dentatus, who fought against Pyrrhus and was also victorious over the Samnites in their valleys high

It was men of this type who built up the great Roman Empire, for they first learned the secret of ruling themselves and put honor before wealth. In their hands the state was safe, but when love of gain and pleasure became the heart's desire of the Romans their empire fell.

THE NEXT GOLDEN DEEDS BEGIN ON PAGE 2235

The Book of POETRY



GRAY'S ELEGY

WRITTEN IN A COUNTRY CHURCHYARD

THOMAS GRAY, the author of this beautiful elegy, was a great scholar, but he did not write very many poems. The churchyard about which he wrote is that of Stoke Poges, in Buckinghamshire, of which a picture is given above as it was in the time of the poet. Gray died in 1771, and was buried in this churchyard. The "Elegy Written in a Country Churchyard" is one of the most perfect poems in the English language. The meaning of an "elegy" is told on page 369.

THE curfew tolls the
knell of parting day,
The lowing herds wind
slowly o'er the lea,
The ploughman homeward plods his
weary way,
And leaves the world to darkness
and to me.

Now fades the glimmering landscape
on the sight,
And all the air a solemn stillness holds,
Save where the beetle wheels his droning
flight,
And drowsy tinklings lull the distant
folds:

Save that from yonder ivy-mantled tower,
The moping owl does to the moon
complain
Of such as, wandering near her secret bower,
Molest her ancient solitary reign.

Beneath those rugged elms, that yew tree's
shade,
Where heaves the turf in many a mouldering
heap,
Each in his narrow cell for ever laid,
The rude forefathers of the hamlet sleep.

The breezy call of incense-breathing morn,
The swallow twittering from the straw-
built shed,
The cock's shrill clarion, or the echoing horn,
No more shall rouse them from their
lowly bed.

For them no more the blazing hearth shall
burn,
Or busy housewife ply her evening care:
No children run to lisp their sire's return,
Or climb his knees the envied kiss to share.

Oft did the harvest to their sickle yield,
Their furrow oft the stubborn glebe has
broke;

CONTINUED FROM 1929



How jocund did they
drive their team
a-field!

How bowed the woods be-
neath their sturdy stroke!

Let not Ambition mock their useful toil,
Their homely joys, and destiny
obscure;

Nor Grandeur hear with a disdainful
smile

The short and simple annals of the poor.

The boast of heraldry, the pomp of power,
And all that beauty, all that wealth e'er
gave,

Await alike the inevitable hour:
The paths of glory lead but to the grave.

Nor you, ye proud, impute to these the fault,
If Memory o'er their tomb no trophies
raise,

Where through the long-drawn aisle and
fretted vault

The pealing anthem swells the note of
praise.

Can storied urn or animated bust
Back to its mansion call the fleeting
breath?

Can Honour's voice provoke the silent dust,
Or flattery soothe the dull cold ear of
Death?

Perhaps in this neglected spot is laid
Some heart once pregnant with celestial
fire;

Hands that the rod of empire might have
swayed,

Or waked to ecstasy the living lyre.

But Knowledge to their eyes her ample page
Rich with the spoils of time did ne'er
unroll;

Chill Penury repress'd their noble rage,
And froze the genial current of the soul.

THE BOOK OF POETRY

Full many a gem, of purest ray serene,
The dark unfathomed caves of ocean bear :
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air.

Some village Hampden, that with dauntless
breast
The little tyrant of his fields withstood ;
Some mute inglorious Milton here may rest,
Some Cromwell, guiltless of his country's
blood.

Th' applause of list'ning senates to command,
The threats of pain and ruin to despise,
To scatter plenty o'er a smiling land,
And read their history in a nation's eyes,

Their lot forbade : nor circumscribed alone
Their growing virtues, but their crimes con-
fined ;
Forbade to wade through slaughter to a
throne,
And shut the gates of mercy on mankind ;

The struggling pangs of conscious truth to
hide,
To quench the blushes of ingenuous shame,
Or heap the shrine of Luxury and Pride,
With incense kindled at the Muse's flame.

Far from the madding crowd's ignoble strife
Their sober wishes never learned to stray,
Along the cool sequester'd vale of life
They kept the noiseless tenor of their way.

Yet e'en these bones from insult to protect,
Some frail memorial still erected nigh,
With uncouth rhymes and shapeless sculpture
decked,
Implores the passing tribute of a sigh.

Their name, their years, spelt by the unlettered
Muse,
The place of fame and elegy supply :
And many a holy text around she strews,
That teach the rustic moralist to die.

For who, to dumb Forgetfulness a prey,
This pleasing anxious being e'er resigned,
Left the warm precincts of the cheerful day,
Nor cast one longing, lingering look behind ?

On some fond breast the parting soul relies,
Some pious drops the closing eye requires ;
E'en from the tomb the voice of Nature cries,
E'en in our ashes live their wonted fires.

For thee, who, mindful of the unhonoured
dead,
Dost in these lines their artless tale relate ;
If chance, by lonely Contemplation led,
Some kindred spirit shall inquire thy fate ;

Haply some hoary-headed swain may say,
" Oft have we seen him at the peep of dawn
Brushing with hasty steps the dews away,
To meet the sun upon the upland lawn.

" There, at the foot of yonder nodding beech,
That wreaths its old fantastic roots so high,
His listless length at noontide would he
stretch,
And pore upon the brook that babbles by.

" Hard by yon wood, now smiling as in
scorn,
Muttering his wayward fancies he would
rove ;
Now drooping, woeful—wan, like one forlorn,
Or crazed with care, or crossed in hopeless
love.

" One morn I missed him on the 'customed
hill,
Along the heath and near his favourite
tree ;
Another came ; nor yet beside the rill,
Nor up the lawn, nor at the wood was he ;

" The next, with dirges due in sad array
Slow through the church-way path we saw
him borne ;
Approach and read (for thou canst read) the
lay
Graved on the stone beneath yon aged
thorn."

THE EPITAPH.

Here rests his head upon the lap of Earth,
A Youth, to Fortune and to Fame un-
known ;
Fair Science frowned not on his humble
birth,
And Melancholy marked him for her own.

Large was his bounty, and his soul sincere,
Heaven did a recompense as largely send :
He gave to Misery all he had—a tear,
He gained from Heaven ('twas all he
wished) a friend.

No farther seek his merits to disclose,
Or draw his frailties from their dread abode
(There they alike in trembling hope repose),
The bosom of his Father and his God

THE PILGRIM

We are already familiar with John Bunyan as a writer of prose, having read his "Pilgrim's Progress" on page 1125. He could also write poetry, though not with so much distinction as he could tell a story. This is one of several short pieces of verse which appear in "The Pilgrim's Progress."

WHO would true valour see,
Let him come hither !
One here will constant be,
Come wind, come weather :
There's no discouragement
Shall make him once relent
His first-avow'd intent
To be a Pilgrim.

Whoso beset him round
With dismal stories
Do but themselves confound ;
His strength the more is.
No lion can him fright ;
He'll with a giant fight ;
But he will have a right
To be a Pilgrim.

Nor enemy, nor fiend,
Can daunt his spirit ;
He knows he at the end
Shall Life inherit :
Then, fancies, fly away ;
He'll not fear what men say ;
He'll labour, night and day,
To be a Pilgrim.

MY MIND TO ME A KINGDOM IS

Sir Edward Dyer, who wrote the following verses on Contentment, was one of the Elizabethan poets. He died in 1607. In this poem, the poet likens his mind to a kingdom wherein his wants, cares and ambitions are all wisely controlled. It is said that this was Abraham Lincoln's favorite poem.

MY mind to me a kingdom is,
Such present joys therein I find
That it excels all other bliss
That earth affords or grows by kind:
Though much I want which most would have.
Yet still my mind forbids to crave.
No princely pomp, no wealthy store,
No force to win the victory,
No wily wit to salve a sore,
No shape to feed a loving eye:
To none of these I yield as thrall:
For why? My mind doth serve for all.
I see how plenty surfeits oft,
And hasty climbers soon do fall:
I see that those which are aloft
Mishap doth threaten most of all;
They get with toil, they keep with fear;
Such cares my mind could never bear.
Content to live, this is my stay;
I seek no more than may suffice;
I press to bear no haughty sway;
Look, what I lack my mind supplies:
Lo, thus I triumph like a king,
Content with that my mind doth bring.
Some have too much, yet still do crave;
I little have, and seek no more.
They are but poor, though much they have,
And I am rich with little store;
They poor, I rich; they beg, I give;
They lack, I leave; they pine, I live.
I laugh not at another's loss;
I grudge not another's gain;
No worldly waves my mind can toss;
My state at once doth still remain:
I fear no foe, I fawn no friend;
I loathe not life, nor dread my end.
Some weigh their pleasures by their lust,
Their wisdom by their rage of will;
Their treasure is their only trust;
A cloaked craft their store of skill:
But all the pleasure that I find
Is to maintain a quiet mind.
My wealth is health and perfect ease:
My conscience clear my chief defence:
I neither seek by bribes to please,
Nor by deceit to breed offence:
Thus do I live; thus will I die;
Would all did so as well as I!

SIGH NO MORE, LADIES

From "Much Ado About Nothing"

In this song, William Shakespeare takes as his theme the inconstancy of men. Women should expect it, he says, and meet it with indifference.

SIGH no more, ladies, sigh no more,
Men were deceivers ever,
One foot in sea and one on shore,
To one thing constant never:
Then sigh not so, but let them go,
And be you blithe and bonny,
Converting all your sounds of woe
Into Hey nonny, nonny.

Sing no more ditties, sing no moe
Of dumps so dull and heavy;
The fraud of men was ever so,
Since summer first was leafy:
Then sigh not so, but let them go
And be you blithe and bonny,
Converting all your sounds of woe
Into Hey nonny, nonny.

O SWEET CONTENT

Thomas Dekker was a dramatist and contemporary of Ben Jonson's. Before his death he wrote more than forty plays. This song is from one of them, "The Patient Grissell," which was acted in 1599.

ART thou poor, yet hast thou golden slumbers?
O sweet content!
Art thou rich, yet is thy mind perplexed?
O punishment!
Dost thou laugh to see how fools are vexed
To add to golden numbers, golden numbers?
O sweet content! O sweet, O sweet content!
Work apace, apace, apace, apace;
Honest labor bears a lovely face;
Then hey nonny, nonny, hey nonny, nonny!
Canst drink the waters of the crisped spring?
O sweet content!
Swim'st thou in wealth, yet sink'st in thine own tears?
O punishment!
Then he that patiently want's burden bears
No burden bears, but is a king, a king!
O sweet content! O sweet, O sweet content!
Work apace, apace, apace, apace;
Honest labor bears a lovely face;
Then hey nonny, nonny, hey nonny, nonny!

THE NYMPH'S REPLY TO THE PASSIONATE SHEPHERD

In another place in the book you can find the passionate shepherd's invitation to his love, by Christopher Marlowe. Sir Walter Raleigh takes up his pen to give the nymph's reply, which is full of a prudence that the gallant adventurer himself never practised.

IF all the world and Love were young,
And truth in every shepherd's tongue,
These pleasures might my passion move,
To live with thee, and be thy love.
But time drives flocks from field to fold,
When rivers rage and rocks grow cold;
And Philomel becometh dumb,
The rest complains of cares to come.
The flowers do fade, and wanton fields
To wayward winter reckoning yields;
A honey tongue, a heart of gall,
In fancies spring but sorrows fall.
Thy gowns, thy shoes, thy beds of roses,
Thy cap, thy kirtle, and thy posies,
Soon break, soon wither, soon forgotten,
In folly ripe, in reason rotten.
Thy belt of straw and ivy-buds,
Thy coral clasps and amber studs,
All these in me no means can move,
To come to thee, and be thy love.
But could youth last, could love still breed,
Had joys no date, had age no need;
Then those delights my mind might move
To live with thee and be thy love.

GOOD-CHILDREN STREET

A POEM BY
EUGENE FIELD

At the very beginning of our book, on page 100, we read one of the most beautiful children's poems ever written. "Wynken, Blynken, and Nod." No doubt many young readers now know it by heart, and they will not need to be told that "Good-Children Street," which was written by the same poet, Eugene Field, is also full of charming fancies and a great love of the simple delights of our childhood. In every poem he wrote he caught some of the charm of childhood.



THERE'S a dear little home in Good-Children Street—

My heart turneth fondly to-day
Where tinkle of tongues and patter of feet
Make sweetest of music play;
Where the sunshine of love illumines each face,
And warms every heart in that old-fashioned
place.

For dear little children go romping about
With dollies and tin tops and drums,
And, my! how they frolic and scamper and
shout

Till bedtime too speedily comes!
Oh, days they are golden, and days they are
fleet,
With little folk living in Good-Children Street.

See, here comes an army with guns painted
red,
And swords, caps, and plumes of all sorts;
The captain rides gaily and proudly ahead
On a stick-horse that prances and snorts!
Oh, legions of soldiers you're certain to meet—
Nice make-believe soldiers—in Good-Children
Street.

And yonder Odette wheels her dolly about—
Poor dolly! I'm sure she is ill,
For one of her blue china eyes has dropped out,
And her voice is asthmatic'ly shrill.
Then, too, I observe she is minus her feet,
Which causes much sorrow in Good-Children
Street.

'Tis so the dear children go romping about
With dollies and banners and drums,
And I venture to say they are sadly put out
When an end to their jubilee comes.
Oh, days they are golden, and days they are
fleet
With little folk living in Good-Children Street.

But when falleth night over river and town,
Those little folk vanish from sight,
And an angel all white from the sky cometh
down
And guardeth the babes through the night,
And singeth her lullabies tender and sweet
To the dear little people in Good-Children
Street.

Though elsewhere the world be o'erburdened
with care,
Though poverty fall to my lot;
Though toil and vexation be always my share,
What care I—they trouble me not!
This thought maketh life ever joyous and
sweet:
There's a dear little home in Good-Children
Street.

From "Love Songs of Childhood," copyright, 1894, by Eugene Field, published by Charles Scribner's Sons.

The Story of FAMOUS BOOKS

THE TALES OF CAPTAIN MARRYAT

CAPTAIN FREDERICK MARRYAT was born in London on July 10, 1792, and died in Norfolk, August 9, 1848. He was a naval officer who won fame as a writer of stories of the sea, which are full of high spirits, while the salt spray seems to blow through them, so true are they to life. "Midshipman Easy" is perhaps his best, but "Masterman Ready," "Peter Simple" and "Jacob Faithful" are all fine stories. "Masterman Ready" we give first, because it was written by Captain Marryat to entertain and instruct his own children, who had been so delighted with "The Swiss Family Robinson" that they wanted their father to continue it. Marryat found that the seamanship of that story and the natural description of the island were all wrong, so that he preferred to write an entirely new story. This we have in "Masterman Ready, or the Wreck of the Pacific," a book which takes its place by the side of "Robinson Crusoe."

MASTERMAN READY OR THE WRECK OF THE PACIFIC

WHEN we first meet Masterman Ready, he is a weather-beaten old seaman on board the big ship Pacific in the middle of the Atlantic. Ready had been more than fifty years at sea. When he was ten he had been bound apprentice on a coal ship that sailed from South Shields. Afterwards he served many years on a man-of-war.

Though still hale and active, he had been in every climate. In cases of difficulty and danger the captain would not hesitate to ask Ready's opinion, and frequently took his advice. On the Pacific he was second mate. This vessel was on her way to New South Wales with a valuable cargo of English hardware, cutlery, and other manufactures.

In addition to the crew, there was on board a family of the name of Seagrave. These were the only passengers. Mr. Seagrave had for many years held an office under Government in Sydney. He was the owner of some valuable property, and was now on his return to the colony with a variety of articles for the improvement of his estate. He was a clever man, but given to talking rather than doing. Mrs. Seagrave was an amiable woman, not in the most robust health. William, the eldest boy, was clever and steady, and soon made friends with Master-

man Ready, who promised to tell him how he was once wrecked, in return for the story of "Robinson Crusoe," of which he had never heard. Thomas, who was six years old, was a very thoughtless if good-tempered boy, full of mischief, and always in a scrape. The two other children were Caroline, a girl of seven; and Albert, a little fellow, who, at the opening of the story, was not yet one year old. Albert was in the charge of a good-natured black girl named Juno. The party had with them two shepherd's dogs, named Romulus and Remus. There was also on board a little terrier, the favorite of the captain.

Soon after leaving the Cape the vessel encountered a terrific gale, which lasted some days. Several men were lost; Captain Osborn was rendered senseless by falling wreckage, and the ship began to leak badly.

When the captain was disabled, the sailors no longer felt themselves under control. They made up their minds to abandon the vessel and the passengers, and take their chance in the one boat that had been left undamaged by the gale. Old Ready decided to remain with the Seagraves; and, despite all the arguments of the other sailors, remain he did. Happily, the weather continued fair, after the crew had left the vessel, until they sighted an island,

CONTINUED FROM 1779



and Ready ran the Pacific aground. His next thought was to repair the small boat that had been left to them.

"And when we get on shore?" queried Mr. Seagrave.

"Why," answered Ready, "where there are cocoa-nut trees in such plenty as there are on that island, there is no fear of starvation, even if we had not the ship's provisions. I expect a little difficulty with regard to water—for the island is low—very low and small—but we cannot expect to find everything exactly as we wish."

MASTERMAN READY GIVES GOOD ADVICE TO A GENTLEMAN IN DISTRESS

"I am thankful to the Almighty for our preservation, Ready; but, still, there are feelings which I cannot get over. Here we are, cast away on a desolate island, which perhaps no ship may ever come near, so that there is little chance of our being taken off. Here we may live and die; here my children may grow up—yes, grow old, after they have buried you, their father, and their mother, and follow us to the same tomb. All their prospects in life, all mine, all blasted, all my hopes overthrown. It is a melancholy and cruel fate, Ready, and that you must acknowledge."

"Mr. Seagrave, as an old man compared to you, I may venture to say that you are ungrateful to Heaven to give way to these repinings. What is said in the Book of Job? 'Shall we receive good of the Lord, and shall we not receive evil?' Besides, who knows whether good may not proceed from what appears evil?"

"You have reproved me very justly, Ready; and I thank you for it," replied Mr. Seagrave. "I will repine no more, but make the best of it."

MASTERMAN READY IS ASKED TO TAKE COMMAND OF THE SHIPWRECKED PARTY

"And trust in God, sir, who, if He thinks fit, will restore you once more to your friends, and increase tenfold your flocks and herds."

"That quotation comes very apt, Ready," replied Mr. Seagrave, smiling, "considering that all my prospects are in flocks and herds upon my land in New South Wales. I must put myself under your orders, for in our present position you are my superior—knowledge is power."

On landing, Ready and Mr. Seagrave decided to fix up a tent by a beautiful sandy cove, a quarter of a mile away. In addition to the three dogs, it may be mentioned that the live stock they had with them included two goats and a kid, several pigs, three or four pigeons, a cow, and a Merino ram and sheep. Juno proved very useful in the preparations for the encampment; but Master Tommy was soon in mischief. A musket, loaded, had been taken on shore and placed against a tree. When no one was looking, the boy pulled the trigger!

Ready, who was on the wreck with Mrs. Seagrave, pulled ashore as soon as he could with another musket, and in a great state of alarm. He found Mr. Seagrave and Juno busy with the tent, and Master Tommy sitting on the ground crying very lustily. It appeared that when the musket went off, its muzzle pointing upwards, the shot brought down two large cocoa-nuts, which fell close to where Tommy was, under the tree, and had they hit him would certainly have killed him. Mr. Seagrave, conscious of the alarm the shot would cause on the vessel, had been scolding him soundly, and the tears were shed to prove repentance. The incident is given as an example of the mischief Master Tommy was capable of making.

PREPARATIONS FOR DEFENCE AGAINST THE COMING OF THE SAVAGES

William and Ready, with the aid of the dogs, found water below the sand on another part of the island, and near here it was decided to build a house. When they had been on the island some time, Ready told the story of his life, and they were all very happy together, until the escape of two black women, who had arrived in an exhausted condition on the island, and whom they had befriended. Then there was a feeling of alarm at what might follow. They built a stockade, and prepared themselves against attack. One day their hopes of release mounted high, for a vessel was sighted. The flag of the Pacific was hoisted aloft; but apparently this was not seen, for the vessel went on its way.

Then one day the long-expected danger showed itself. A large number of canoes laden with savages was seen approaching. About this time William thought he saw another vessel under sail. The savages, after devoting themselves to

the old house, came up to the stockade. Happily the garrison were prepared. Juno handed up the muskets, which Mr. Seagrave, Ready, and William used to advantage. There was a fierce combat for an hour, when the savages drew off.

In this interval a discovery was made that struck consternation into the hearts of the gallant little garrison. Ready had some time before this filled the water-tub. This was now found to be empty. Tommy was the cause of this disaster. There had been a washing, and he had been told to go to the well to fetch water for the purpose. He came back so soon that everyone called him a good boy. The fact was that he did not go to the well at all. He had fetched the water from the water-tub that had been filled for emergencies.

Ready, on a previous occasion, had risked his life for Tommy. That young gentleman had, against orders, gone out in the boat, and his rescuer almost fell a victim to the sharks which swarmed round the island. It was Ready who now determined to go once more to the rescue. He could no longer bear to see the children and Mrs. Seagrave suffering so much for the want of water. He succeeded in his purpose, but was fatally wounded by one of the savages just as he regained the door of the stockade. The savage was shot, and

the brave old seaman was dragged within the defensive walls.

The savages shortly after returned for a general assault. Suddenly the reports of the muskets fired by the defenders were drowned by a much louder

A SCENE AT THE SEASIDE IN THE DAYS OF THE PRESS GANG



At the beginning of the nineteenth century, during the time of Britain's wars with France, the British Navy was kept supplied with men by the Press Gangs, or companies of sailors sent ashore to capture men for service at sea. The taverns of the seaport towns were favorite places for finding victims of the Press Gang, as we see in this picture of life in the days of "Masterman Ready" and "Peter Simple."

report. Another and another followed, and the savages fell in great numbers. Round shot and grape came whizzing and tearing through them. They turned and fled to their canoes. William, going to the look-out, discovered that his

earlier surmise had been a true one. The shots came from a large schooner, which was sending a boat full of armed men ashore. William came down, opened the door of the stockade, and fell into the arms of Captain Osborn. Thus were the Seagraves saved.

It now appeared that the brig that came off the island some months before did see the signal made to her; but the weather was so rough that the captain made all speed to Sydney, and there reported what had taken place.

The boat in which the seamen of the Pacific had left that vessel, taking with them their unconscious captain, had been picked up and taken to Van Diemen's Land. Here Captain Osborn settled. When he heard the report brought by the brig, he induced the Government to

lend him a vessel in which to seek his former shipmates.

Ready lived long enough to see Captain Osborn again, and to thank God for the preservation of those for whom he had worked so well. The closing scene is thus described:

"Ready opened his eyes. 'Are you there, William? I can't see you. Listen to me, my dear boy! Let me be buried under the trees on the mound above the well. I wish to lie there. Poor little Tommy! Don't let him know that he was the cause of my death. Bring him here now, and Juno and Caroline, to say good-bye, William.'"

The old man's last wishes were reverently attended to, the Seagraves prospered, and Tommy "grew up a very fine fellow and entered the Army."

PETER SIMPLE AND SOME OF HIS STORIES

LIFE AT SEA IN THE DAYS OF THE PRESS GANG

THE period to which the story belongs is the early part of the last century, when Great Britain was at war with France. When Peter Simple was a boy he was regarded as the "fool of the family." His father, a clergyman of the Church of England, was a younger son of Viscount Privilege. Having no prospects of advancement, Peter went to sea.

In rising from the position of a midshipman to that of post-captain, Peter Simple rendered brilliant service to his country, and incidentally helped to give the foemen an impression that the English were a chivalrous people. On one occasion he was taken prisoner. He then met a General O'Brien, a French officer of Irish birth, who had a charming daughter, Celeste. After many daring adventures and hairbreadth escapes, one of the latter being from Bedlam Asylum, where he was confined by a wicked uncle, Peter succeeded to the peerage and the headship of his family, and married the beautiful Celeste.

Peter kept a journal. In this he recounted what befell him from early days, and his narrative is full of vivid pictures of life at sea, and of the different characters he met with while afloat. Some of these characters were chivalrous to a degree, notably his friend Terence O'Brien, a big-hearted Irishman. Terence and Peter had many stirring times

together. Then there was the boat-swain, Mr. Chucks, who aspired to be a gentleman, and, through the accident of wearing a captain's coat in a certain engagement in which he was wounded and left for dying, became a Swiss count. Another humorous character was the carpenter, Mr. Muddle, who believed that "in 27,672 years, everything that was going on now would be going on again, with the same people."

The language used at the time of the story was often the reverse of polite; but these were the days of the Press Gang, when men were pressed into the Service whether they liked it or not, and when promotion in the ranks of the officers often depended upon personal influence at the Admiralty.

Peter Simple's first cruise was to the Bay of Biscay. He describes how the master's mate, O'Brien, took him in charge and cured him of sea-sickness.

"We ran through the Needles, with a fine N.E. breeze. I admired the scenery of the Isle of Wight, looked with admiration at Alum Bay, was astonished at the Needle rocks, and then felt so very ill that I went down below. What occurred for the next six days I cannot tell. I thought that I should die every moment, and lay for the whole of that time, incapable of eating, drinking, or walking about.

"O'Brien came to me on the seventh morning, and said that if I did not exert myself I never should get well, that he was very fond of me, and had taken me under his protection, and to prove his regard he would do for me what he would not take the trouble to do for any other youngster in the ship, which was to give me a good basting, which was a sovereign remedy for sea-sickness. He suited the action to the word, and drubbed me on the ribs without mercy, until I thought the breath was out of my body, and then he took out a rope's end and thrashed me until I obeyed his orders to go on deck immediately. Before he came to me I could never have believed it possible that I could have obeyed him; but somehow or another I did contrive to crawl up the ladder to the main-deck, where I sat down on the shot-racks and cried bitterly.

HOW TERENCE O'BRIEN CURED PETER SIMPLE OF SEA-SICKNESS

"What would I have given to have been at home again! It was not my fault that I was the greatest fool in the family, yet how was I punished for it! If this was kindness from O'Brien, what had I to expect from those who were not partial to me? But, by degrees, I recovered myself, and certainly felt a great deal better, and that night I slept very soundly.

"The next morning O'Brien came to me again. 'It's a nasty slow fever, that sea-sickness, my Peter, and we must drive it out of you'; and then he began a repetition of yesterday's remedy until I was almost a jelly. Whether the fear of being thrashed drove away my sea-sickness, or whatever might be the real cause of it, I do not know, but this is certain, that I felt no more of it after the second beating, and the next morning when I awoke I was very hungry. I hastened to dress myself before O'Brien came to me, and did not see him until we met at breakfast. 'Peter,' said he, 'let me feel your pulse.' 'Oh, no,' replied I; 'indeed, I'm quite well.' 'Quite well! Can you eat biscuit and salt butter?' 'Yes, I can.' 'And a piece of fat pork?' 'Yes, that I can.' 'It's thanks to me, then, Peter,' replied he; 'so you'll have no more of my medicine until you fall sick again.' 'I hope not,' replied I, 'for it was not very pleasant.' Pleasant! You simple

Simple, when did you ever hear of physic being pleasant, unless a man prescribe for himself? I suppose you'd be after lollipops for the yellow fever. Live and learn, boy, and thank Heaven that you've found somebody who loves you well enough to baste you when it's good for your health.'

PETER IS THANKFUL FOR HIS THRASHING, BUT WANTS NO MORE MEDICINE

"I replied that I certainly hoped that, much as I felt obliged to him, I should not require any more proofs of his regard. 'Any more such striking proofs, you mean, Peter; but let me tell you that they were sincere proofs, for since you've been ill I've been eating your pork and drinking your grog, which latter can't be too plentiful in the Bay of Biscay. And now that I've cured you, you'll be tucking all that into your own little breadbasket, so that I'm no gainer, and I think that you may be convinced that you never had or will have two more disinterested thumpings in all your born days. However, you're very welcome, so say no more about it.'

"I held my tongue, and ate a very hearty breakfast. From that day I returned to my duty, and was put into the same watch with O'Brien, who spoke to the first lieutenant, and told him that he had taken me under his charge."

Among the many amusing stories told by Peter Simple is O'Brien's account of how Fingal, the Irish king, who preceded the great Brian Boru, "bothered the great Scotch giant."

HOW THE IRISH KING FINGAL BOTHERED THE GREAT SCOTCH GIANT

"Fingal, you must know," said O'Brien, "was a giant himself, and no fool of one; anyone that affronted him was as sure of a bating as I am to keep the middle watch to-night. But there was a giant in Scotland as tall as the mainmast, more or less, as we say when we a'n't quite sure. Well, this Scotch giant heard of Fingal, and how he had beaten everybody, and he said: 'Who is this Fingal? I'll just walk over and see what he's made of.' So he walked across the Irish Channel, and landed within half a mile of Belfast, but whether he was out of his depth or not I can't tell, although I suspect that he was not dry-footed.

"When Fingal heard that this great chap was coming over he was in a terrible

fright, for they told him that the Scotchman was the taller by a few feet or so. Giants, you know, measure by feet, and don't bother themselves about the inches. So Fingal kept a sharp lookout for the Scotchman, and one fine morning there he was, sure enough, coming up the hill to Fingal's house. If Fingal was afraid before, he had more reason to be afraid when he saw the fellow, for he looked for all the world like the Monument upon a voyage of discovery. So Fingal ran into his house, and called to his wife Shaya. 'Mavourneen,' says he, 'be quick now; there's that big bully of a Scotchman coming up the hill. Kiver me up with the blankets, and if he asks who is in bed, tell him it's the child.' So Fingal laid down on the bed, and his wife had just time to cover him up when in comes the Scotchman, and though he stooped low he broke his head against the portal. "Where's that baste Fingal?" says he, rubbing his forehead. 'Show him to me, that I may give him a bating.'

THE SCOTCH GIANT ARRIVES AT THE HOUSE OF FINGAL

"Whist, whist!" cries Shaya, 'you'll wake the babby, and then him that you talk of bating will be the death of you if he comes in.'

"Is that the babby?" cried the Scotchman with surprize, looking at the great carcase muffled up in the blankets.

"Sure it is!" replied Shaya, 'and Fingal's babby, too; so don't you wake him, or Fingal will twist your neck in a minute.'

"Then," replied the giant, 'it's time for me to be off; for if that's his babby, I'll be but a mouthful to the fellow himself. Good-morning to ye.'

"So the Scotch giant ran out of the house, and never stopped to eat or drink until he got back to his own hills, forebly he was nearly drowned in having mistaken his passage across Channel in his great hurry. Then Fingal got up and laughed, as well he might, at his own cuteness."

Mr. Falcon, the first lieutenant on Peter Simple's first vessel, always punished good-humoredly, and, in some way or other, his punishments were suited to the offence. He always had a remedy for everything that he disapproved of, and the ship's company used to call him "Remedy Jack."

"I was much amused one morning," writes Peter Simple. "We were stowing the hammocks in the quarterdeck nettings when one of the boys came up with his hammock on his shoulder, and as he passed the first lieutenant the latter perceived that he had a quid of tobacco in his cheek."

"REMEDY JACK'S" WAY OF DEALING WITH A VERY OLD COMPLAINT

"What have you got there, my good lad—a gum-boil? Your cheek is very much swelled."

"No, sir," replied the boy, 'there's nothing at all the matter.'

"Oh, there must be; it is a bad tooth, then? Open your mouth and let me see."

"Very reluctantly the boy opened his mouth and discovered a large roll of tobacco-leaf."

"I see, I see," said the first lieutenant, 'your mouth wants overhauling, and your teeth cleaning. I wish we had a dentist on board; but, as we have not, I will operate as well as I can. Send the armorer up here with his tongs.'

"When the armorer made his appearance the boy was made to open his mouth, while the chaw of tobacco was extricated with this rough instrument."

"There now," said the first lieutenant, 'I am sure that you must feel better already; you never could have had any appetite. Now, captain of the after-guard, come forward, bring a piece of old canvas and some sand here, and clean his teeth nicely.'

HOW THE CABIN-BOY'S TEETH WERE SCRUBBED WITH SAND AND CANVAS

"The captain of the after-guard came forward, and putting the boy's head between his knees, scrubbed his teeth well with the sand and canvas for two or three minutes."

"There, that will do," said the first lieutenant. 'Now, my little fellow, your mouth is nice and clean, and you'll enjoy your breakfast. It was impossible for you to have eaten anything with your mouth in such a nasty state. When it's dirty again come to me, and I'll be your dentist.'

Which you will admit was a very good way of curing the boy of a nasty habit that used to be common among sailors, and has not yet quite disappeared.

THE NEXT STORY OF FAMOUS BOOKS IS ON 2197.

THINGS TO MAKE AND THINGS TO DO



MAKING A DOLL'S HOUSE

MOST boys have sisters, and if they have not they are pretty sure to have girl cousins who would be glad to have a doll's house. And a doll's house is by no means a difficult or an expensive thing to make.

The first thing we want is a box from which to make our doll's house, and we may be successful in finding the nearest grocer willing to let us have an empty box that would suit. Some boxes, such as grocers have, are very suitable indeed. A packing-box, for instance, is just about the right size, the wood is nice and thin, so that it is not difficult to work, and one side of it hinges with a wire hinge, which will enable one side of our doll's house to open and close so that its proud owner may arrange the furniture in the rooms we are about to make. We can explain what we want to the grocer, and he will give us the nearest box he can to suit our purpose. Picture 1 shows the house we are about to make when it has been finished and furnished.

We shall suppose that we have got two empty boxes, and shall see how we can adapt them to make a good doll's house. One of the boxes will serve as the frame of the house, and the other we shall

CONTINUED FROM 1944

cut up to make partitions and floors. Upon the bottom of one box, outside, we make a drawing something like picture 2, which shows a hall door in the centre of the ground floor of our house, with a large window at each side, and up near the top we have three windows which will be on the upper floor when the house is finished.

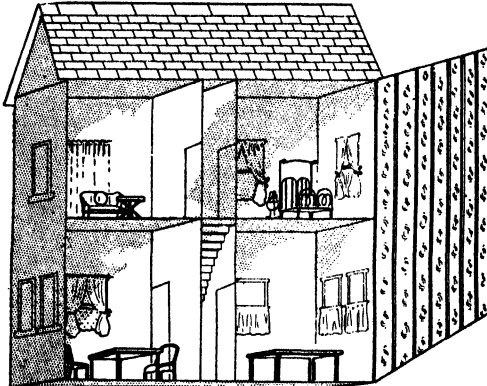
We can cut out the windows and the door, leaving the window-sills and door-posts drawn upon the wood.

Upon the back of the house, which is the lid of the box upon which we are working, we make the drawing of picture 3, but in this case we had better not cut out the windows and door, because this would weaken the back wall too much, and we wish to keep it

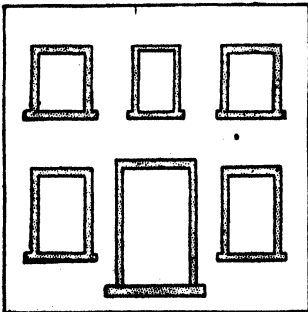
strong so that it may open and close without breaking. But on each side of the house we make a drawing like picture 4, and in this case we cut out the windows, as we did in making the front wall.

We now attend to the inside of the house, and for the partitions and floors we cut up the second box that we were lucky

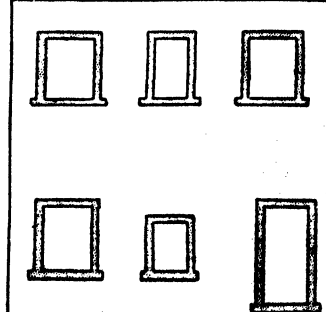
enough to get. If the second box is the same size as the first box, we take out one end carefully and it will do for a floor which



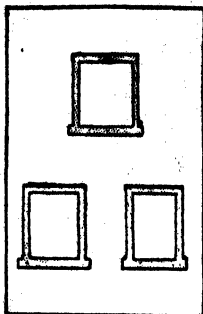
1. The doll's house completed and furnished



2. Front of the doll's house



3. Back of the doll's house



4. The side of the house

care that we have it level.

Now measure the distance from front to back in the ground floor, and the height from the floor to the roof. Make two partitions to go in, as shown in picture 5, and make two similar partitions for the upper floor. It will be seen that the lobby goes right from the front door to the back of the house. The upstairs lobby has a window at each end. The doors should be cut in the partitions as shown, but in one partition we make two doors—one at each end of the partition. We shall see why, presently. When all these pieces are ready, but not nailed into their places, we can make the stair to lead from the ground floor to the upper floor. About the best thing to use for the stair is an empty cigar-box, if we can get one. Tobacconists have usually plenty, and we should be able to get one without difficulty.

We cut the lid of the cigar-box to the shape seen in picture 6, making the total height the same as the height of the ground floor, so that the top of the stair will be on the level of the upper floor. Then we cut the bottom of the cigar-box exactly in the same way, and that gives us two sides for our stair. We glue one of these pieces to one partition and the other piece to another partition, seeing that the front of the stair is clear of the doors of the two partitions. Now we cut short pieces from the remaining wood of the cigar-box to make steps to go right across the lobby—making front pieces, or *risers*, as they are called, as well as top pieces, or *treads*. The part of the lobby under the stair will make a nice scullery or closet, which has a door leading from the kitchen.

We now see why one partition had two doors; one of the doors leads from the lobby into the kitchen and the other from the kitchen into the scullery. We now cut a hole of suitable size in the upstairs floor to take the top of the stair. We are now ready to nail the floor into position, and

we put across rather more than half-way up the height of our house. We shall thus give the ground floor rooms roofs a little higher than the upstairs rooms. We had better not nail the floor into position yet, because, before we do so, we must cut a hole for the stairway, and we are not ready for that yet. But with books or something else we can prop up the floor temporarily, taking

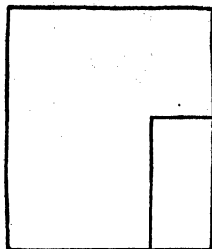
we do so by driving thin wire nails through the side walls and front of the house, being very careful to get them straight into the floor. Similarly we nail the partitions into place. The position of the partitions and stair will then be as seen in picture 7.

We shall provide our doll's house with a sloping roof, and, taking our sizes from the present flat roof, we make and erect upon the latter a sloping roof, as shown in picture 8. It consists of two large sloping sides and two end pieces of triangular shape. The sloping side that goes down over the front wall may be made so that it sticks out quite a little beyond the front of the wall, which will give us eaves projecting in front of the house. We must, however, have the back roof shorter than the front, because the hinged back wall will not allow us to have eaves at the back of the house. When we have made this roof we nail it to the flat roof of the house, being careful that the back edge does not prevent the back wall of the house from hinging open.

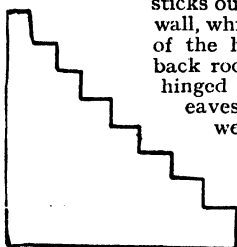
The structure of the house is completed, but we have still something to do in the way of interior decoration. We can paper the walls of the different rooms with wallpaper. We can use ordinary wallpaper with a very small pattern, or plain tinted paper; but the best sort of wallpaper for a doll's house is the sort of fancy paper the bookbinders sometimes use for the inside covers and fly-leaves of books. This paper is sold by many stationers.

We can fit small panes of glass into the window-spaces that we cut out, and we can even drape the windows with curtains. If we put in glass windows we shall require eleven pieces of glass, which should be a little longer and a little wider than the eleven window-spaces that we have cut out. The simplest way to fix them will be to put in two sharp tacks just below each window so that the glass may rest upon them, and other two tacks at top to keep the glass from falling into the rooms. The doors of the various rooms can be provided with hinges by using cloth or thin leather, glued into place.

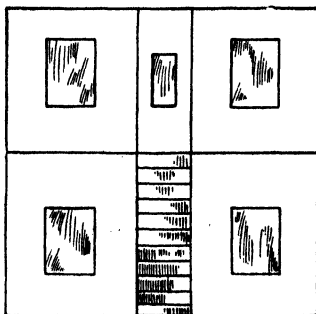
A chimney can be made for the roof, and the outside can be painted, say, slate color for the roof, and red with black lines on the walls to imitate bricks. Then the house is ready to be furnished with the furniture which we have seen how to make in another part of this book.



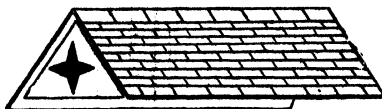
5. The partition



6. The side of the stair



7. Partitions and stair in place



8. The roof of the house

WHAT TO DO WITH A BOX OF BEADS

WE all know how to thread beads, and many little girls can make a ring of beads for their finger; but here we are going to see how to make something more interesting than plain chains and rings.

We shall want two little bundles (or "hanks," as they are called) of glass beads, one pink and one blue, and a few bugle beads, the long, round ones like little tubes.

The "hanks" cost about two or three cents each, and contain twelve rows of beads.

In picture 4 we see a plaited necklace with tasseled ends, just fit for a big doll. To make this necklace, separate three rows of beads from the hank, and, without letting any slide off the thread, carefully knot the threads together at one end; then plait the three rows of beads—in the same way as we should plait our hair. Then knot the other ends of the thread close up to the finish of the plait.

Now, with a needle and thread we begin the tassels. We shall notice that a bugle comes next to the plait. To fix this on, we must tie the end of a thread (attached to the needle) to the end of the plait with a small knot, and then thread on the bugle in the usual way. Next thread on a big round bead of some pretty color (a pearl color (a pearl bead will look well if we can find one), and then take *one* of the glass beads from the hank and thread that on. Hold it close up to the big bead and put the needle through it *again*, drawing the thread tightly round the bead. This bead will now be firmly fixed; it keeps the big bead and the bugle in position while we make the tassel.

Still with the same thread take up twelve glass beads, push them up close to the fixed bead, and "fix" the last one—the twelfth bead—in the same way by passing the thread through again and drawing it tightly. Now we have to pass our needle through the eleven beads again, bringing it out at the other end. Each piece of the tassel is made in this way. So you see there are *two* threads in each piece and a fixed bead at the end. Make five pieces and our tassel is complete. When we have made a tassel at the other end of the plait, the necklace will be finished.

Now let us look at picture 3. This is a plain chain necklace with little "bobs," or pendants, hanging from it all the way round.

We begin by attaching one end of an ordinary fastener, or catch, to our thread. If we cannot find one of these from an old necklace, a piece

of baby ribbon from a chocolate-box will make quite a pretty fastening.

Thread on about twenty pink beads, then one blue one, then four pink ones, one pearl (a good deal bigger to form the bob), and then one blue one again. This last blue one has to be *fixed* in the way we have already learned.

When the last blue bead is fixed, return the needle *through* the pearl bead and also through the four pink glass ones; then thread on one more blue bead and ten more pink ones. We shall see now that we have made a piece of the chain with one little pendant hanging from it.

After the ten pink beads we must thread one more blue one, and make another pendant in the same way, then ten more pink beads, and so on, to the end of the necklace.

We can, of course, make it as long as we like—but we must decide how long it is to be before we start, because it is very tiresome to find that we have not enough thread on the needle. It makes the necklace look nicer if we add one more pink bead to the pendant

each time, until we get to the middle, then we must leave one off each time in order to make the other side match.

If we look carefully at the picture we shall see why this has been done—it makes the centre "bob" the longest, and gives a better appearance to the necklace.

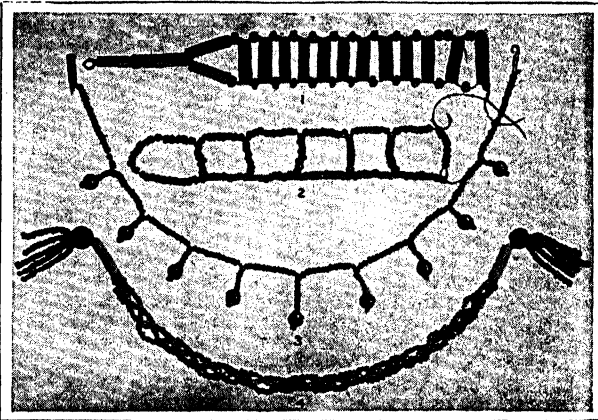
Picture 1 shows a ladder bracelet made

of bugles and blue beads. For these ladders we must work with *two* threads instead of one.

We take about a yard for each needleful, and tie the ends of the two threads together with a good big knot. Now we thread on one bugle and pass both needles and cottons through it; then we put on two bugles, one on each cotton; then a blue bead on each cotton—that makes the start. The next bugle that comes is the first step on the ladder and goes "across."

To get this we have to put both needles through the bugle, one in at one end and one in at the other, so making the threads cross to the other side of the ladder. Next put on two blue beads, one each side, and then another crossway bugle in the same way as the last. We continue this until our chain is long enough for a bracelet, when we finish it off with three beads in the same position as the three we started with.

It will make it easier to manage if we fix the end, after we have made a start, to the



Bead bracelets and necklaces for dolls

THINGS TO MAKE AND THINGS TO DO

table-cover or a pincushion. To do this we must put a safety-pin through the knot at the beginning.

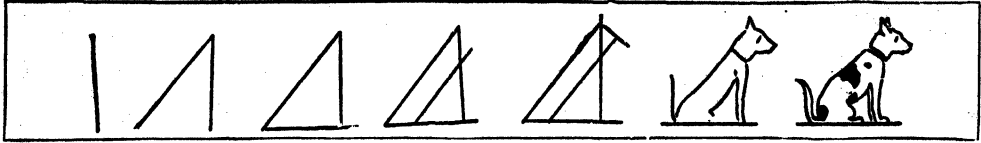
Picture 2 shows a ladder chain made of small beads only. It is made in just the same way as the bugle ladder, with two threads.

We start with twelve beads on each thread, and then put eight across, then eight each side, and eight more across. If we find that it

is a little difficult to prevent it from slipping out of place when we first begin, "fix" the last side bead of each eight before threading on the eight across. But we ought not to find this at all hard to manage.

Now that we have learned how to make these necklaces and bracelets, we shall probably be able to invent quite a number of new ways of threading beads for ourselves.

A SIMPLE WAY TO DRAW A DOG



If you want to draw a dog, and you are not clever at drawing, this shows you how to make a splendid little dog by the aid of three straight lines drawn faintly in pencil in the form of a triangle. The first picture shows an upright line, the second shows two sides of

the triangle, and the third shows the triangle complete. The next two pictures provide the guide lines for the under side of the dog's body and the lines for his head. When you have filled in the outline, the pencil lines, of course, should be rubbed out.

HOW DID THE KING'S JESTER ESCAPE FROM PRISON?

LONG ago, when every king had his jester to make jokes and amuse him and his courtiers by saying funny things at table, one king got it into his head that his jester was a wizard. That was the time when people suspected of being wizards or witches were put to death; and the king cast the jester into prison.

While there in his dungeon high up in the castle, the jester's nimble wits tried to find a way of escape for him. The difficulty was that the window of the prison was so high above the moat that, even if the iron bar were removed from the window, and the jester could manage to squeeze his body through it, the distance was too great to jump, and the walls gave no foothold. So that this way of escape seemed to be quite impossible.

In peering all around the prison where he was, the jester, to his delight, found a piece

of thick rope hidden away in the darkest corner. A rope was just what he wanted.

But, alas! it was far too short to reach the ground.

What was he to do? In his "Canterbury Puzzles" Mr. Dudeney tells how the jester managed to reach the ground with the short piece of rope.

He remembered hearing the story of the Irishman who had a blanket that was too short for him, and lengthened it by cutting a yard off the bottom and joining it on to the opposite end. That was just an Irish tale, but it gave an idea to the jester; for he divided the rope into two halves and fastened the two parts together again, and so he was able to let himself down from the window by the rope.

But how did the jester manage to make the rope long enough to reach down to the ground?



HOW TO TELL THE WEATHER

IT is always useful to be able to tell the weather, that is, to judge by the condition of the sky and the atmosphere, and so on, what the weather is likely to be in the next twenty-four hours. Of course, a great deal depends upon the locality, for conditions that mean coming wind in one place may mean rain in another. But there are general principles that are worth remembering, and will help us in our study of the weather.

If at sunset the sky appears red, fine weather may be looked for on the coming day; but if the sky is red in the morning there will probably be wind or rain. A yellow sky in the evening generally means a wet day to follow, and if the sun sets in a dense bank of clouds, rain may also be looked for. If the morning is hazy, and the sun is seen through a mist but the sky appears blue, the day will most likely be warm.

If the early morning is cloudy, but as the time goes on the clouds begin to disperse, a fine day is to be anticipated. When the stars seem particularly bright at night, and twinkle more plainly than usual, a wet day usually follows. We may often get a good idea of the weather that is likely to be experienced by watching animals. Cats often rub themselves behind the ears a great deal when bad weather is coming, and before rain cats are restless and lie with their backs to the fire.

These are only some of the ways in which we may get an idea of what the weather is likely to be, but there are many other indications, which may be learned by observation, and the studying of the local conditions and the watching of results provide excellent training for the mind, and practice for the eye.



BOYS AND GIRLS AT WORK MAKING BOX FURNITURE

LOUISE BRIGHAM AND BOX FURNITURE

THE boys and girls who are going to learn to make Box Furniture will want to know something about Miss Louise Brigham, the woman who invented it, and so I am going to tell you briefly how the idea grew from a tiny acorn to a stalwart oak.

Miss Brigham is a Boston girl, thrifty by nature. As a child she loved to do things with her hands, and made useful and pretty things out of the scraps that were given her. Her special delight was to keep things in order; her dolls' trunk and her bureau drawers were so systematically arranged that there was a place for everything and everything was in its place. You will wonder what this has to do with Box Furniture. It was this sense of thrift and order that enabled her to see the great possibilities of the ordinary box which comes from the grocer.

The box has taught her many things. Its shape (the oblong or the cube) is one of the fundamental forms in art, and so instead of concealing it, Miss Brigham made it the foundation of her designs, and has always kept it. She combined boxes in good proportion, she removed box covers, or a box side, according to the design, but she always kept before her the beauty of the straight lines that composed it. If the reader will bear this idea in mind while making Box Furniture according to the instructions, carefully studying the accompanying illustrations, he will see that while the furniture is beautiful, the idea of the box is never lost. If we get at the ideal back of the form in any work we do in life, we shall learn more quickly and thoroughly than if we merely follow a diagram or set of instructions.

Miss Brigham wished above all things to help her fellow men and experience taught her that the best way to do that, was to

help them to help themselves. By choice she lived in the most crowded foreign district of Cleveland, and so happy was the influence of her little home that it was known as the "Sunshine Cottage" and its mistress lovingly nicknamed Queen Louise. It was in Sunshine Cottage that the idea of Box Furniture was born. Miss Brigham had noticed that many things in homes were thrown away as useless, simply because no one had thought out what to do with them. If a soap box was used for "spill over" things, the majority of people covered the box with something to conceal it. It never occurred to anybody to see beauty in a soap box, or the possibility of making it into something else. But the inventor of Box Furniture proved that discarded boxes and crates could be made beautiful as well as useful, and that an artistic home was possible no matter how humble. If she happened on a family that could not afford a high chair for baby, she manufactured one with her own skilful hands, from discarded boxes, that was more durable and better looking than any to be found in the shops.

She taught fathers and mothers, boys and girls to make things for themselves.

Thus she had already made some experiments in the making of Box Furniture when she went to camp on the island of Spitzbergen. The camp was in a spot about 700 miles north of the Arctic Circle; the port of Hammerfest in Norway was the nearest point from which supplies could be obtained, and Hammerfest was 535 miles distant. During the long eight months of winter even this place could not be reached, and the islanders were shut off completely from the world. All their food and clothing and the needful implements for working the coal mines on the island had to be brought across



Boys taking discarded boxes into the workshop to be made into Box Furniture.

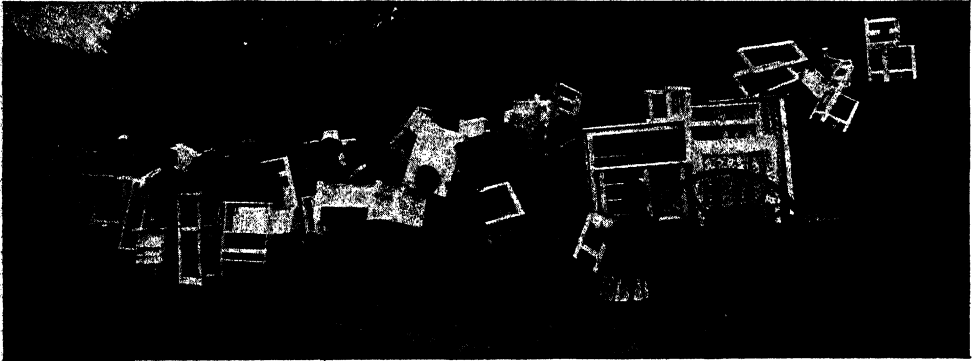
from the mainland during the short summer months. New settlers in Spitzbergen would have to go in summer time in order to get the camp fixed up ready for the winter.

As soon as the portable house which was to serve as camp for Miss Brigham and her hosts had been set up, they unpacked their supplies and found that they had numbers of empty boxes. These boxes were the only lumber on the island, for no trees—except a dwarf willow which creeps along in favored spots—will grow in that climate. Yet there was no place to store it and no immediate use for it. Miss Brigham saw her opportunity and begged that she might have the "odds and ends" to carry out her ideas in box furnishings.

A work bench was set up and the work began. Every day the interest in the boxes grew and the Danish peasants who gathered round made guesses as to what this new one was going to be. In that region of midnight sun there are long hours of light and the plans could be carried to a finish while

Brigham moved a cartload of cast-off boxes into an empty apartment and proceeded to build her home around her. The boys in the neighborhood begged to help her that they too might learn to make furniture. This little home drew crowds of visitors, and a second and third apartment followed. They were called Box Corner First, Second, Third. The furniture for the last apartment was entirely made by the neighborhood boys as an expression of gratitude to Miss Brigham for all she had taught them.

By and by an exhibition called the Child Welfare Exhibit was held in New York by good people who were trying to see that all possible happiness should be brought into the lives of the children who live in the crowded parts of this great city. A room furnished with Box Furniture, formed part of this exhibition and the simple, artistic furniture attracted so much attention that the result was the formation of the Home Thrift Association with Miss Brigham as director. The City of New York gave her



The load of empty boxes has been transformed into Box Furniture to take home to father and mother or little baby brother or sister. All of these have been made from ordinary boxes, often thrown away.

enthusiasm was keen. It may happen that boys and girls who will make Box Furniture when they have studied about it cannot carry out their plan so quickly. Perhaps they have only a few spare hours from lessons to give it, or the winter evening is short and it is "so soon time to go to bed!" Nevertheless, if they have patience to put up with delays and pick up their work just for a short time, they will often find that in the interval a new thought has come to them which helps the work. When the furniture was finished it was used to furnish the little cottage—to the great delight of the "carpenter's" hosts.

The Walter Wellman exploring expedition was in that region during that summer, exploring the polar areas to the north of Spitzbergen. Their base was on Danes Island, a hundred miles nearer the Pole, but on one occasion members of the party landed in Spitzbergen to pay a friendly visit. As soon as they saw the comfortable little cottage with its attractive Box Furniture, one of the explorers said, "You have the northernmost civilized home in the world."

When she returned to New York, Miss

the free use of the ground floor of the old Gracie Mansion in Carl Schurz Park for work shops for boys and girls, but the work of this association grew so rapidly that it was necessary to take an entire house where the work could grow without cramping. Here boys and girls learned to transform waste material into artistic furniture and home decoration of every kind. The work soon proved itself to be of so much value to the children that, at the Panama Exposition, Miss Brigham was given enough free space to furnish a house of seven rooms, so that many others might learn how to make it.

So many demands were made for furniture made from Box Furniture designs, that a company was formed to manufacture furniture in good wood from Miss Brigham's designs. The fame of the Box Furniture spread far and wide, and a flourishing business has grown out of the ideas which a young girl first used to teach her poorer neighbors that economy and a love of beauty can go hand in hand. Although Box Furniture is now made in beautiful woods, she

still keeps in her studio the original furniture made by her boys from boxes, a reminder of the happy days when she first inspired them to use their hands and minds.

In the following pages, and elsewhere in this book, you will find directions for making some Box Furniture. Other ideas will

come to you as you work, and you may have the pleasure of helping to beautify your summer camp or home in the country, or your own room in the city, or you may have the joy of giving some of your own work to your friends. There are few pleasures greater than giving something you have made.

HOW TO MAKE BOX FURNITURE

DO you know the possibilities of a soap box, just an ordinary soap box which the grocery boy will gladly give you, or the shop-keeper will sell for a few pennies? A plain every-day soap box may be converted by magic into an attractive piece of furniture which is both useful and practical. This is not a stage trick to amuse an audience, but an actual bit of carpentry of great value. It was Miss Louise Brigham, of Box Furniture fame, who first experimented and transformed humble and discarded material into objects which proved worth-while in the home, especially where space was limited. She showed by actual experiment how the summer cottage, the city home and even the class-room could be fitted up with very small expense.

Do you love to tackle a hammer and saw, and tinker around making things for yourself? Would you like to know how to make something you have never made before? And would you like to have in your room some special pieces of furniture which you have made yourself? Usually when we buy furniture that is striking or new or unique, we find that it is very expensive. There is nothing commonplace about Box Furniture and yet it is surprisingly inexpensive.

The materials necessary are a wide-awake boy or girl, a box, a few tools, and a spare hour or two. There are boxes and boxes, yet each box has its possibilities: salt box, candle box, soap box, packing box, tea box, condensed-soup box, shoe box, and a host of others. Keep your eyes open for boxes, for there is a use for each and every one. Are you ready with a box?

WHAT DO WE NEED TO KNOW BEFORE BEGINNING?

Box Furniture is so easy to make when we know how, that a few general directions before beginning will help us in making all the articles. The old motto, "Make haste slowly," will be a good one to follow in our work. First, we must find out what we are going to make, what tools and what materials we need, and then go ahead.

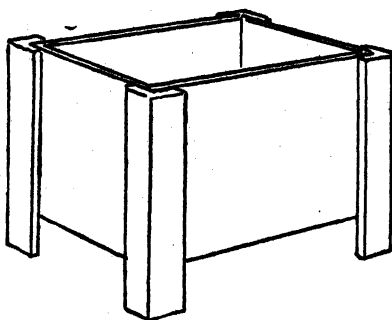
The designs and outlines described are taken, by permission of the publishers, from Miss Brigham's book, *Box Furniture*, copyright, 1909, by the Century Company.

WHAT KIND OF A BOX DO WE NEED?

When we are asked to get a certain kind of box, it means a box about that size is necessary, but a box with another name of nearly the same dimensions will do just as well. We must try to select the best box we can find, for the way the finished article will look depends very much upon the condition of the box we use. Do not use a box which has large knot-holes, or which has a name or advertisement branded deep upon its surface, or which is marred and split. Some boxes are now made having "dovetailed" corners. These are not satisfactory, if the directions say that a side or an end is to be removed.

HOW LARGE A BOX SHALL WE SELECT?

We must use our own judgment in selecting the size, although the directions give the proper proportions which we must observe. For instance, if we are making a book-case, and have a space in the room of forty inches to fill, do not try to make a book-case which is forty-two inches wide. The size of the box means the actual outside measurement of the box suggested. Try to follow the directions closely, so that the work will look well.



A Small Plant Box.

HOW ARE THE LEGS MADE?

The legs, or corner trim as we sometimes say, are always made the same way in all the articles. They are easy to make, for they are made of one narrow and one wider strip joined together to form a right angle. When the pieces are nailed together each side of the angle will measure just the same. In joining them use finishing nails or large brads $1\frac{1}{2}$ inches long, driven about three or four inches apart. To make them hold better, use a little glue before nailing them.

WHAT KIND OF NAILS DO WE NEED? HOW ARE THEY USED?

It is well to have on hand a quantity of nails when beginning your work. Besides the common nails with regular heads, you will need some finishing nails, the kind used

by the carpenter for fine work when the nails should be as nearly invisible as possible. The smaller finishing nails are called brads or sprigs, and range in size from $\frac{3}{8}$ inch to $1\frac{1}{2}$ inches, and are so made that they may be driven almost out of sight without danger of splitting the wood. When nailing together the various parts, drive the nails so that their points will be hidden, and drive the heads a little below the surface so they will not show. In joining boxes, the nails are driven from the inside of one box through its side (or end, as the case may be), into and through the adjoining box. Use nails of the proper length to project an eighth of an inch or more inside of the latter box, where the points may be bent over at a right angle, which is called "clinch the nail." Avoid much clinching if you wish the work to look neat. In attaching the legs, screws may be used.

How Is the Box To Be Finished?

Fill any nail-holes or other defects with a mixture of putty and sawdust. We add a little sawdust to the putty, as pure putty will not absorb the stain. A few sheets of sandpaper, Numbers 0, $1\frac{1}{2}$ and 2 will be needed to smooth the surface.

You will be surprised at the excellent results you can obtain in painting or staining your own furniture. The prepared paints, stains and varnishes sold in most of the paint shops make a good finish. There are a number of preparations on the market, equally satisfactory for our use. The most popular stains are Weathered Oak, Flemish Oak, Rosewood or Dark Mahogany, Mission or Golden Oak. The darker stains are better for our use, although a white finish is very satisfactory in some cases.

How Shall We Apply the Stain?

Be sure the surface is dry and clean, and the rough places all sandpapered. If the article is made of soft wood, there will be more flaws than if hard wood were used. Look after any dents, bruises, or cracks, and press a little putty with a pliable knife into the holes before painting or staining. Now apply a first or priming coat to the wood, using a small brush and working it backwards and forwards across the grain. Let this coat get thoroughly dry before applying the next. Let it stand overnight or even forty-eight hours if the weather is damp or muggy, and then sandpaper it a little and apply the next coat. Of course, varnish gives the wood a nice appearance, but there is another reason why we go to the trouble and expense of using it; it is because varnish preserves and protects the surface from becoming scratched. When varnish dries, it forms a thin, hard, transparent film of resin, which keeps out moisture.

What Tools Do We Need?

Before beginning to work, be sure your tools are ready and in good condition. It is better to have a few sharp tools, rather than a child's tool-chest or a large collection

of cheap tools. Here are the tools that we need: a large hammer with a good claw, an iron-handled screw-driver, an iron jack-plane, a square, a rule, a good saw (a rip-saw is useful, too, but not necessary), and an iron vise screw for the work bench. Any boy who has a good set of tools comprising the seven mentioned and a big jack-knife, which every boy owns, is well equipped for the work. Take good care of your tools; never leave them lying about, nor let them get damp, for rust, you know, is a fatal enemy to tools.

A MINIATURE PLANT BOX

WHEN spring comes, father and the boys are busy planting seeds, and how we wish we could put some seeds in the earth, too! If we are going to have a wee garden of our own in the summer, it is well to plant the seeds early. This plant box we are going to make can be used for our early seeds, and if it is made nicely, it will look well on the dining-room table where we may watch the seeds grow. And we shall take great pride in observing the flowers grow in the boxes which we have made.

These boxes may also be used for growing small ferns or little flowering plants, and make a very attractive centrepiece for the dinner table. If we make four boxes alike, they may be placed in front of the living-room window, or on the window sills, and a variety of flowers may be grown.

MATERIALS NEEDED.

We need one salt box, or any box that is about 5 inches deep and 6 or 7 inches square. For the legs, we must have four strips $\frac{1}{4}$ inch thick, $\frac{3}{4}$ inch wide, and $1\frac{1}{2}$ inches longer than the height of the box, and four more strips $\frac{1}{4}$ inch thick, 1 inch wide and $1\frac{1}{2}$ inches longer than the height of the box.

How To Make the Plant Box.

Take the cover off the box, and plane the sides in case they are rough. Then trim off the three sides at the top of the box which contain the grooves that hold the cover.

To make the legs, join one narrow and one wider strip together, and nail them so that each side of the angle measures alike. In joining them together, use small finishing nails $\frac{3}{4}$ inch long, driven about $1\frac{1}{2}$ or 2 inches apart. Make the legs 1 inch longer than the height of the box after it has been trimmed. To make the parts hold more firmly, use a little glue before nailing.

Place a leg at one corner, keeping the top of the leg even with the top of the box. Place a string around it and the box to hold it until you have nailed it firmly. Use nails about 1 inch long. Carefully sandpaper the box and fill imperfections with putty, and stain or paint it any color you desire.

If you are making the box for the dining-room table, you may like to have a more artistic finish. If so, make the legs so that they will project $\frac{3}{4}$ of an inch above the top of the box as well as $1\frac{1}{2}$ inches below.

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO AT THE END OF NOVEMBER

ON another page we promised to give a list of some of the best plants to grow in our rock gardens. Here we shall find them; but we must understand that if the weather is sharp and frosty or wet, and the soil too full of moisture to work, the actual planting must be put off until the spring.

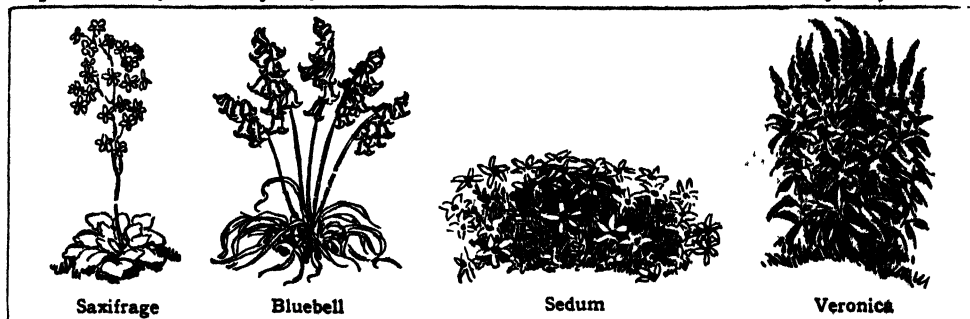
If you have not space to make a little rock garden it is possible to make a bit of rockery edging, and that, too, will give great pleasure. You could do this at any time when the weather is open and fine, and leave the planting until the spring; and you will use rock or clinker to form it, as you would in making the more important piece of rock garden.

And now for our list of plants. You will remember that we recommended, in May or June, to rear some of these from seed to be in readiness for the rock garden you were thinking of making; but if you failed to rear seed you can buy a plant or two of each kind quite cheaply, and, as they soon grow into large masses in many cases, you will not need to plant closely. Give plenty of room, and,

quite small and dwarf, others, again, are giants in comparison. We can have some of both kinds, and give them positions in which the soil is rather moist and cool.

We must not forget how the primroses love moisture, and grow and flower well with quite a small amount of sunshine. And perhaps with the primroses you will like to grow some other beautiful plants of the same family called auriculas. These are so extremely beautiful and choice that often keen and enthusiastic gardeners make them their hobby flowers, as it were, and spend a great deal of time and attention upon them.

The thrifts will grow in dry spots; if we keep our eyes open when we go about we shall notice how well these flourish in the sandy soil of seaside places, and from this fact we can draw our own conclusions and decide that cool, moist positions will not suit them. All good gardeners make careful observation of the plants that flourish in different neighborhoods, and take note of the nature of the soil wherever they may be.



Saxifrage

Bluebell

Sedum

Veronica

PLANTS FOR THE ROCK GARDEN

above all things, do not be disappointed the first season if the plants are small and the masses of flowers only tiny patches. Wait—wait—wait. It is wonderful what one year's growth will do. These little patches will grow into large clumps and masses.

The saxifrages are capital rock-garden plants. There are several kinds; some known as the mossy varieties have a charming appearance, while among the rosette kind you will be able to include that good old favorite London Pride. We need not go into the question of the many different kinds; it will be enough just to get as many as we can, and when we can, and where we can. Of the sedums, too, we could, if we wished, make quite a long list of the many different kinds, but again there is no need. It is well to know they succeed in hot, dry positions.

The beautiful pink family, that we ought more properly to call the Dianthus family, will give us some delightful plants, and they, too, and also the rock roses, may have warm and sunny positions given to them.

Of course, we may need plants for cooler spots quite as much as these sun-lovers, and for such positions we may have many bell flowers, or campanulas. Some of these are

Some of the dwarf speedwells are grand plants for the rock garden, but if we search for them in a catalogue we shall have to look them up under the title of veronicas. There is no need, I think, to give you a longer list; for, after all, you can plant any of the pretty dwarf plants you can get in your rock garden and experiment with them.

It will be helpful if you make a point of finding out the kind of soil of which your garden is composed, because you will often read that such or such a plant flourishes in this or that soil. Is your soil of a peaty nature, or a clayey or chalky nature, or a loamy or sandy nature? Find the answer to that question, and you will be sure to benefit by the knowledge sooner or later. Besides, it is interesting to know, just as it is interesting to know if your garden faces north or south, east or west.

If it has not already been done, you might like to put up an archway over your pathway. It will be necessary to put the wooden supports a considerable distance down in the soil, and they last longer if this portion of them that has to be covered with earth is tarred. A honeysuckle or clematis or a climbing rose may be planted to cover it.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 2135.

PRESIDENT LINCOLN AND HIS CABINET DISCUSSING EMANCIPATION



This famous picture represents President Lincoln reading the Emancipation Proclamation to his Cabinet. On September 22, 1862, it was announced that slaves in the seceding states would be declared free on January 1, 1863, unless the states returned to the Union. No state returned, and the proclamation was issued. The seated figure at the left is Edwin M. Stanton, Secretary of War, while Secretary Chase of the Treasury stands behind him. Secretary Seward is seated in front, and Gideon Welles, Secretary of the Navy, is across the table. The seated figure behind Secretary Seward is Edward Bates, the Attorney-General, while Caleb B. Smith, Secretary of the Interior, and Montgomery Blair, Postmaster-General, stand in the background.

The Book of THE UNITED STATES

THE HISTORY OF THE UNITED STATES

YOU were told in the last volume of the growth of the great West, and also how new states were made. You learned that some of the new states allowed slavery and some did not, and that often there was a fierce dispute over the question, as the South wished to keep the number of slave states equal to the number of free states. Now we are to learn that the South failed in this attempt and that the growth of the Republican party was thought to be dangerous to Southern interests. Then we learn of the great war which followed the attempt of eleven states to leave the Union and form a new nation. We shall find that often brother fought against brother, and that for four years one of the greatest wars in history was fought. Finally the Confederacy was over-come, the slaves were set free, and the states returned to the Union.

THE BROTHERS' WAR

IN our last story we followed the history of Our Land a little beyond the point where our country reached to the Pacific Ocean. From thirteen states, all bordering on the Atlantic, it had grown, before 1861, into thirty-four states with a large amount of territory not yet ready to be made into states. The population had grown from about 4,000,000 people into about 32,000,000 and the increase in wealth had been rapid.

Men had swarmed over the mountains, and crossed the plains. Railroads and canals had been built, and steamboats were on the rivers and lakes. Thousands of inventions had been made to do the work formerly done by hand. Thousands of factories were turning out goods of every kind. Mines had been opened, and forests had been cleared away. Schools and colleges had grown in number and in size. Great newspapers had been established and many books were printed every year.

DISAGREEMENTS WHEN THE CONSTITUTION WAS MADE

Now we come to tell of the great war which was fought between the states. As the result, nearly a million men lost their lives and an immense amount of property was destroyed. But this war did not really begin in 1861, though the first battles occurred then. It began early in our history

CONTINUED FROM 1848

and in order to understand the war, we must go back and understand some other things first.

We have learned in other volumes that there was jealousy between different sections at the time the Constitution was adopted. The Southern states were farming states, while the New England states were trading states, though manufacturing soon became important. The farming states wished to buy the goods they needed where they could get them cheapest, and wished them carried as cheaply as possible. The New England states wished laws putting a tax on foreign ships, so that they might get all the business.

On the other hand, some of the Northern states wished to give Congress power to forbid the bringing of any more negroes from Africa, to which some of the Southern states would not consent. So it had been agreed that Congress might pass navigation laws, and might forbid the slave trade after twenty years. There had been other disputes about whether slaves should be counted in laying taxes, and in deciding upon the number of Representatives in Congress a state should have. These had been settled by counting five blacks as equal to three whites in counting population for these purposes. The blacks did not vote, and so the whites had more influence than in the North.

NORTH AND SOUTH WERE DIFFERENT FROM THE BEGINNING

Then there were differences in the people themselves. The settlers of the New England states came, for the most part, from the English towns, and they settled in many little towns. A large part of the settlers of Maryland, Virginia and the Carolinas came from the country and hoped to build up large estates in their new homes. After Charles I was put to death in England, many of his followers came to Virginia. While some members of the English aristocracy settled in the North, and many men of Puritan ideas came to the South, we may say that New England was Puritan in sentiment and that the South was aristocratic in some sections, though not in all.

In the early days of our country, the farms in the North, except on the Hudson River, were small, while in the South there were many large estates. The wealthiest and most prominent people in the North lived in towns and made their money from commerce, while in the South this class lived on large plantations. Slave labor was not profitable in the North, while, after the invention of the cotton gin, many slaves could be employed in the South. The North turned early to manufacturing, while the South bought most of the manufactured goods it needed from the North or from Europe.

SOME OF THE POINTS ON WHICH THE SECTIONS DIFFERED

All these differences existed before the year 1800, and many men saw that the sections were likely to grow more unlike as the years went on. There were disputes about many things but the one which was most in the public eye was the question of slavery. The South thought it was more profitable to grow crops of cotton, rice, and tobacco than to build factories, but the people wished to buy goods as cheaply as possible. The first Congress put a tax on foreign goods, and the taxes were raised afterwards. These taxes helped the North to get higher prices for its manufactures, which the South thought unfair.

As we have told you before, all the colonies held slaves at first, but since slaves were not profitable in the North they were set free or sold. Few people anywhere thought slavery wrong, though

many thought it unwise. One of the strongest enemies of slavery was Thomas Jefferson, though he owned slaves, and many other Southerners also wished to get rid of slavery, though no one could see exactly how it could be done, nor what would become of the negroes if they were set free.

You have already been told that the South tried to keep the number of slave states equal to the number of free states, and have been told of the Missouri Compromise, which was then thought to settle the question, but it was settled only for a short time. The cause of further trouble was the increase of the number of people called abolitionists. These abolitionists believed that slavery was wrong and ought to be abolished in spite of the Constitution and the laws.

THE ABOLITIONISTS BEGIN THEIR FIGHT ON SLAVERY

Newspapers to advocate this belief were printed. At first the abolitionists were not liked in the North any more than they were in the South. In Boston, Philadelphia and other cities, they were attacked and beaten when they tried to speak. In some places their printing offices were destroyed and some of the editors were killed by mobs. In 1833 a school for negro girls in Connecticut was broken up, and the teacher was sent to jail. The abolitionists did not stop speaking and writing, and after a time more and more Northern and Western people began to think as they did. In the South they were thought to be as dangerous as men with torches going around at night setting fire to houses.

After the Mexican War, of which you read on page 1842, the North wished to shut out slavery from the territory gained from Mexico, and wished to admit California as a free state. The South was not willing and the Compromise of 1850, which was introduced by Henry Clay, followed. This agreement admitted California as a free state, did not forbid slavery in the other territory, but did forbid any slave to be brought into the District of Columbia for sale, and declared that a stricter law for sending back runaway slaves to their masters ought to be passed.

HOW THE FUGITIVE SLAVE LAW CAUSED TROUBLE

This Fugitive Slave Law, as it was called, was much disliked in the North

and in many states was not obeyed. When the officers of the law arrested runaway slaves, their prisoners were often taken from them by mobs, and the abolitionists declared that even if the Constitution did say that runaways must be sent back, there was a "higher law" than the Constitution, and that they were right to disobey the laws of Congress.

In the first fifty years of the Union many young men went from the South to Northern colleges and many Northern men went South to teach. But as the dislike and suspicion between the sections grew, this happened less frequently. The Southern people sent to England and France for their books and magazines, as they found themselves attacked in the Northern works. The disputes even entered some of the churches. The Methodists, Baptists and Presbyterians divided themselves into Northern and Southern branches, and so the people of the sections had less and less to do with one another.

A BOOK WHICH HELPED TO BRING ON WAR

In 1852, a book was published which helped to arouse the people against slavery. This was Uncle Tom's Cabin, written by Harriet Beecher Stowe, a sister of the famous preacher, Henry Ward Beecher. It showed both the best and the worst of slavery, but paid most attention to the worst. It also made clear the fact that the death of a kind owner, or his failure in business, might separate families and bring his slaves in the power of a brutal man, who would abuse them. Thousands of copies were sold and the book was translated into several languages. Men in the North, who had never thought much about slavery, became strong enemies after reading the book.

THE KANSAS-NEBRASKA BILL INTRODUCED BY STEPHEN A. DOUGLAS

Now a dispute arose about what was called the Nebraska country. Senator Stephen A. Douglas, of Illinois, in 1854, reported a bill organizing the two territories of Kansas and Nebraska, giving the inhabitants the right to say whether they wished slavery or not. He and those who voted with him said that the Missouri Compromise, which forbade slavery north of 36° 30', had been done away with when the Compromise of 1850 was passed, and that the people of a ter-

ritory knew best whether they wished slavery or not. This idea was called "squatter sovereignty." This bill passed after a fierce discussion and both North and South sent men to Kansas, each trying to get the majority. It is said that men who really lived in Missouri went into Kansas and voted. For two years there was fighting, but finally the free state party got control. When the Kansas-Nebraska Act was passed, one abolitionist, William Lloyd Garrison, publicly burned a copy of the Constitution, saying, "The Union must be dissolved."

A NEW PARTY IS FORMED TO FIGHT SLAVERY

Other abolitionists did not believe this, and a new political party was formed to oppose slavery. This was made up of men from both the Whig and the Democratic parties who had come to believe that something must be done to prevent the spread of slavery. The new organization was called the Republican party, but before this, the Liberal party had had a candidate for president in 1844, and four years afterward the Free Soil party got many votes. Later most of its members joined the new Republican party. One of the things which made many men join the new party was the "Dred Scott Decision" by the Supreme Court. This declared that Congress had no power to keep slavery out of a territory, and that a state itself was the only body which could decide this question.

We have named no presidents after Polk. He was succeeded by General Taylor, the hero of the Mexican War, who soon died in office, and Millard Fillmore, the Vice-President, succeeded him. Then a Northern man, friendly to the South, Franklin Pierce of New Hampshire, became president. In 1856, James Buchanan of Pennsylvania, another friend of the South, was elected, though the Republican candidate, John C. Fremont, of whom you read on page 1842, carried most of the Northern states.

Until this time the South had generally controlled the government. From the beginning of Washington's first term until the Civil War was seventy-two years. During that time Southern presidents had been elected for terms amounting altogether to fifty-two years, while only five Northern presidents had been

elected for one term each, or twenty years in all. Now the South knew that the North had increased so much faster in population, and the Republican party was growing so rapidly that it would soon be in control. Just then, in 1859, something happened to excite the South still more.

JOHN BROWN AT HARPER'S FERRY IN VIRGINIA

John Brown had been engaged in the riots in Kansas, and had done his share of the bloody work there. He determined to stir up the slaves to rise against their masters. In 1859, with a few followers, he appeared near the village of Harper's Ferry, Virginia (now West Virginia), where the United States had an arsenal, or storehouse, for weapons of war. On the night of October 16, 1859, he captured the arsenal, expecting that the slaves in the neighborhood would soon flock to him. After being supplied with arms, they were to be sent out to burn the houses of the whites, and kill the men, women and children. Brown thought that this would frighten the Southerners so much that they would abolish slavery.

But things did not turn out as he expected. The negroes did not come to aid him, but the white men from the neighborhood assembled, and surrounded the arsenal. Finally some United States marines were sent and he and his companions were captured. He was tried and hanged, but many of the abolitionists approved his plan, and called him a martyr. Nowadays most people believe that he was partly insane from thinking so long on the subject of slavery.

In the South the story of John Brown's plan and the news of the fact that many people in the North approved of it, stirred up many people who had hoped that the quarrel between the sections could be settled, and more and more people began to talk of leaving the Union.

ABRAHAM LINCOLN ELECTED PRESIDENT, SOUTH CAROLINA SECEDES

When the time for electing another president came, in 1860, the Republicans nominated Abraham Lincoln, about whose life you may read on page 785. The Democratic party split into two parts, one nominating Stephen A. Douglas, and the other John C. Breckinridge, of Kentucky. Some other men,

who called themselves the Constitutional Union Party, nominated John Bell, of Tennessee. Because of the number of candidates, Lincoln was elected though he did not get a majority of the votes.

As soon as it was known that Lincoln was elected the Governor of South Carolina called a convention to decide what that state would do. On December 20, 1860, this convention repealed the act by which it had ratified the Constitution, seventy-two years before, and declared that the state was again independent as it had been before it accepted the Constitution of the United States. During the next six weeks, Mississippi, Florida, Alabama, Georgia, Louisiana and Texas followed the example of South Carolina. The other states which allowed slavery were Maryland, Delaware, Virginia, North Carolina, Kentucky, Tennessee, Arkansas and Missouri. These states did not wish to secede, though they sympathized with the other slave states.

THE CONFEDERATE STATES GOVERNMENT IS ORGANIZED

In February delegates from the seven seceding states met at Montgomery, Alabama, and organized a government which they called the Confederate States of America. Jefferson Davis, of Mississippi, was elected President, and Alexander H. Stephens, of Georgia, Vice-President. With a few changes they adopted the Constitution of the United States. Nearly all the United States forts, shipyards and arsenals were taken, as it was said that a foreign government had no right to hold territory in their country. Fort Sumter in Charleston harbor, and a few others, had United States soldiers in them who were not willing to surrender.

Many of the officers of the army and navy, who had been born in the South, resigned and went to their native states. They had been taught from childhood the doctrine of States' Rights, and said that a man's first duty was to his state and not to the nation. So we shall see that very often the opposing generals had been at West Point together.

President Buchanan was an old man who loved the Union and could not bear to think of seeing it destroyed. He did not believe that a state had a right to secede, but at the same time he did not believe that the Union had any right

FOUR CONFEDERATE LEADERS



These four men, all graduates of West Point, had most to do with the Confederate armies. Jefferson Davis had been Secretary of War in President Pierce's Cabinet. Robert E. Lee, before Virginia seceded, was offered the command of the United States army, but refused, and for four years fought for the independence of the Confederacy. Thomas Jonathan Jackson, better known as Stonewall Jackson, was Lee's most trusted lieutenant, and was perhaps the greatest military genius of the war. He was accidentally shot by his own men at Chancellorsville. Joseph E. Johnston was not a reckless officer and some thought him too cautious, but he was a skilful soldier and his soldiers trusted him, though President Davis did not like him.

to prevent it by force. So during the last months of his term he was very unhappy and did not know what to do. He did send a ship with provisions for Fort Sumter, but when it was not allowed to land them, did not send an armed vessel to force the men in Charleston to allow the supplies to be landed.

WHY THE SOUTHERNERS THOUGHT THEY WOULD SUCCEED

Soon Lincoln was inaugurated president, but many efforts to prevent war were made. The men who had made the Confederacy did not believe that the North would fight, but if war did come, they thought that all the slave states would join them, that they would get much help from Northern men opposed to the abolitionists, and from Europe. They supposed that England could not do without their cotton, and would soon force the North to make peace. In all of these things they were disappointed, as we shall see.

Lincoln finally determined to send supplies and reinforcements to Fort Sumter. When the news reached the South, it was decided to capture the fort. Firing was begun on Friday, April 12, 1861, and on Sunday afternoon the fort surrendered. Though it had been much damaged, and had been set on fire by the bursting shells, not a man on either side had been killed. Five days later some Union troops marching through Baltimore were attacked by a mob and several were killed.

These two events were like a match in powder. Up to this time many men in the North had believed it better to let the states go if they insisted. Now everybody was in favor of war. In the Confederacy it was felt that they had gone too far to go back.

FOUR OTHER STATES SECEDE

The next day President Lincoln called for 75,000 men to volunteer as soldiers. Every state was called on for its part of that number. The slave states which had not seceded, were now forced to decide whether they would fight with the South or with the North. Virginia at once seceded, followed by Arkansas and Tennessee, and at last on May 20, 1861, North Carolina joined the Confederacy. Richmond was made the new capital and the Confederate government moved there.

Kentucky attempted to remain neutral, but this was not allowed, and the state stayed in the Union. In this state the people, and even families, were much divided. In many cases brothers fought on different sides. Missouri was also divided, but the Union men succeeded in preventing secession. Delaware and Maryland were north of Washington and stayed in the Union, though at first Maryland was restless. The western counties of Virginia were opposed to secession, and were made, during the war, into a new state called West Virginia.

THE NORTH AND SOUTH AT THE BEGINNING OF THE WAR

Now let us see something about the two sections. The eleven seceding states had about 9,000,000 people but about 3,500,000 of these were slaves. The nineteen free states and the four slave states which did not secede had 22,000,000 people. The North had many mills, factories and ships; the South had very few, as agriculture was the chief business. There were more railroads in the North, and more cities and towns.

You would think at first that the South would be beaten at once, but it had some advantages. In the first place nearly every Southern soldier could ride and shoot when he joined the army, and he knew also something about life in the open air. Many Northern soldiers had never fired a gun nor ridden a horse before they enlisted. Then too, the negroes could do many things which soldiers did in the Union army, such as driving wagons, taking care of horses and the like. Lastly, most of the battles were fought on Southern soil, and an invading army needs men to guard the road by which it gets its supplies.

THE UNION FORCES START FOR RICHMOND, BUT DO NOT GET THERE

When President Lincoln called for troops after the capture of Fort Sumter, they came quickly and soon the officers were drilling them around Washington. They were only a mob, for it takes time to make soldiers, but the people of the North were impatient, and the newspapers and public speakers kept crying, "On to Richmond." The generals knew that the Union forces were not ready to fight, but many of the men had joined only for three months, and their time was almost up. So on July 16, 1861, about 35,000 men under General Irvin

McDowell marched out of Washington towards about 23,000 Confederates, commanded by General Beauregard, who had been at West Point with General McDowell. They met, July 21st, at a little stream called Bull Run, near the village of Manassas.

At first the Union forces seemed to be successful and the Confederates gave way, but General T. J. Jackson "stands like a stone wall," the Union troops were checked, and victory seemed trembling in the balance. Just then 8,000 fresh Confederate troops came up, the Union forces were thrown into a panic, and did not stop until safe in Washington.

This battle encouraged the Southerners and many thought that the war was over. It showed the North that the war would not be over in three months as had been expected. So General George B. McClellan, who had been successful in defending Western Virginia, was put in command and began to make an army out of the unorganized forces.

WHAT THE UNION FORCES WERE TRYING TO DO

There were over twenty-four hundred battles, great and small, during the war, and one hundred and twelve were real battles. We cannot mention all of these, but can tell only of the most important. The Union forces were trying to do several things: (1) to capture Richmond; (2) to blockade the Southern ports, thus preventing the Confederates from sending out cotton and bringing in supplies of all kinds, bought with the money thus gotten; (3) to gain the Mississippi River and in that way cut the Confederacy in two; (4) to drive the Confederates out of Kentucky, capture Tennessee, and so reduce the territory held by them.

Early in 1862 the Confederates held two forts in Tennessee, one, Fort Henry, on the Tennessee River, and the other Fort Donelson, on the Cumberland River, only fifteen miles apart. The first named was attacked, in February, 1862, by gunboats under Commodore Foote and troops under General U. S. Grant, whom we shall hear more about later. Fort Henry was easily taken, but the garrison escaped to Fort Donelson, which was then attacked. In a few days it too was taken and 15,000 men were captured. The capture of these forts forced the Confederates to give up most of Kentucky and Tennessee.

THE BATTLE OF SHILOH, WHICH WAS WON BY BOTH SIDES

These were not the only contests in the West. General Grant moved to Pittsburg Landing on the Tennessee River, and stopped there with 45,000 men. General Albert Sidney Johnston with 40,000 men decided to attack him. General Johnston had had an unusual career. He had graduated at West Point in 1826, two years before Jefferson Davis. In 1834 he resigned from the army, settled in Texas and soon became the commander of the Texan forces in the struggle for independence. After Texas was annexed to the United States, he won golden opinions in our war with Mexico. At Monterey, three horses were shot under him. After the war, he again joined the United States army, and led the army to Utah, about which you were told on page 1844. At the beginning of the Civil War, he resigned and was appointed a general in the Confederate army.

Without warning on April 6th he attacked the Union forces near Shiloh Church, drove them back to Pittsburg Landing and seemed about to capture the whole army, but was wounded and died fifteen minutes afterward. General Beauregard, the same who bombarded Fort Sumter, succeeded to the command, but halted to rest his men. During the night the Union forces received 24,000 fresh men, and the next day Beauregard was forced to retreat. In a few weeks more the Confederates lost control of the Mississippi River down to Vicksburg in Mississippi. A large part of the Union plan had succeeded in the West.

HOW A GREAT UNITED STATES NAVY WAS CREATED

Now what of the blockade of Southern ports? At the beginning of the war the navy was small and widely scattered, but every effort was made to increase it. Remember that this was before the days of iron ships. Now it takes several years to build a warship. Then anything which could carry guns was used. Merchant vessels, river steamboats, and even ferry boats ordinarily used to carry passengers between New York and Brooklyn became a part of the blockading fleet.

Late in 1861, Hatteras Inlet on the North Carolina coast, and Port Royal, in South Carolina, were taken, and also something happened which almost

brought on a war with England. The Confederate government had sent James M. Mason and John Slidell to Europe to try to get England and France to recognize the independence of the Confederacy. They were taken from the British ship, Trent, by a United States warship and carried to Boston. England was very angry and if the men had not been given up at once might have declared war, though she had claimed the right to stop and search ships until 1856.

THE MERRIMAC AND THE MONITOR, THE FIRST IRON SHIPS

When the United States Navy Yard at Norfolk was abandoned, a new vessel, the Merrimac, was sunk. The Confederates raised her, cut off her sides, added a sloping roof of iron, and renamed her the Virginia. On March 8, 1862, she came out and destroyed the Cumberland and the Congress. The heavy shot of these ships made little more impression on her than tennis balls would have done. The next day when she came out to finish the destruction of the Union fleet, she was met by a little "cheese-box on a raft," which had arrived from New York the night before. This was the Monitor, also an ironclad of a new type, which had been invented by a man named Timby and improved by a Swedish engineer, John Ericsson. For five hours the two ships fired at each other. Neither could do the other much harm, but the Merrimac (or Virginia) was no longer so much dreaded and a few months later was destroyed by the Confederates when they gave up Norfolk.

FARRAGUT ENTERS THE MISSISSIPPI AND TAKES NEW ORLEANS

Another Union success was the capture of New Orleans by Commodore Farragut. This officer, though born in Tennessee, did not join the Confederacy, but April 24, 1862, led his fleet up the Mississippi River, in spite of the fire of Forts Jackson and St. Philip, and on the next day took possession of New Orleans.

But what of the Army of the Potomac which General McClellan had been drilling? For many months it remained quiet, but finally in March, 1862, General McClellan began to move toward Richmond, but by a very roundabout way. At Yorktown he was delayed for a month, and after the town was captured, found that some of the guns which looked so dangerous were painted logs of wood.

Twelve thousand men had held back a hundred thousand. Slowly McClellan advanced toward Richmond and at one time was within four miles of the city, but waited for more men.

STONEWALL JACKSON IN THE SHENANDOAH VALLEY

But he could not get more men because of Stonewall Jackson. That officer with a small force moved into the Shenandoah Valley to threaten Washington. He drove General Banks across the Potomac, and though three armies tried to capture him, he was always able to fight and then to escape. With less than 25,000 men altogether, he had beaten 60,000 at different times, alarmed Washington and saved Richmond. It had been intended to send some of the Union troops to help take Richmond, but Jackson kept them all busy.

Meanwhile General McClellan had been defeated at Seven Pines, or Fair Oaks. General Johnston was wounded and was succeeded by General Robert E. Lee, who held the chief command on the Confederate side until the end of the war. After the Seven Days' Battle (June 25-July 1) McClellan was forced to retreat without capturing Richmond. Many of his troops were taken from him and a new army was formed to defend Washington.

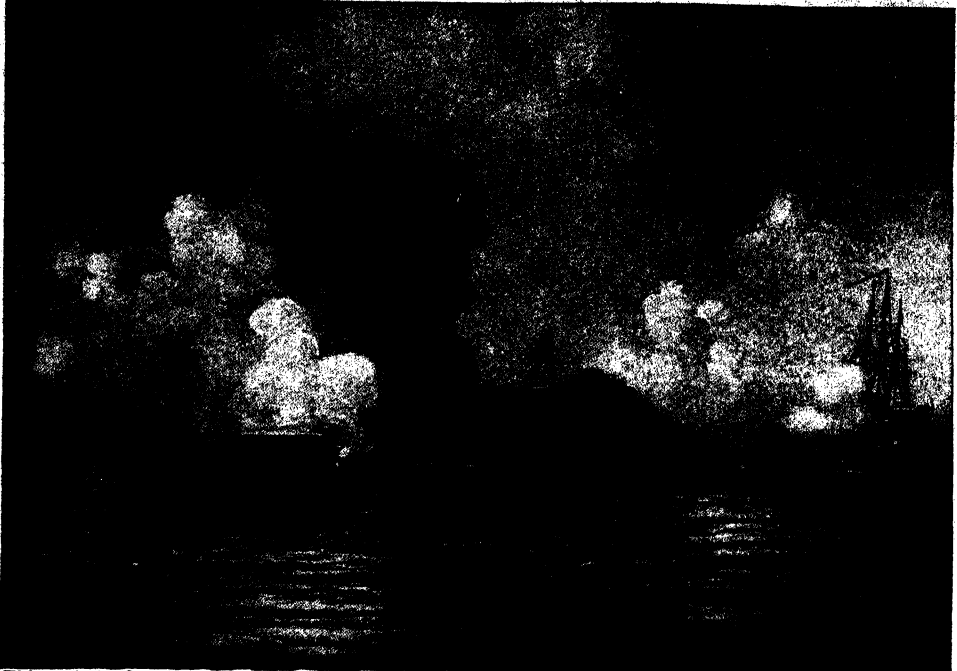
Next Lee turned to meet General Pope, who had been successful in the West, and now commanded the troops in front of Washington. With the assistance of Stonewall Jackson, Lee inflicted a crushing defeat at the old battlefield of Bull Run, and captured a large quantity of supplies. General Pope had boasted of what he was going to do too soon.

GENERAL LEE NEXT INVADES UNION TERRITORY

General Lee now determined to invade Maryland, and at Sharpsburg (or Antietam) met McClellan, who had again been put in charge of the Army of the Potomac. The latter got a copy of Lee's plan of campaign but was too slow to use it. Though he had about 90,000 men to Lee's 50,000 neither general could really claim the victory, but General Lee changed his plans and returned to Virginia. More men were lost on the second day than on any other day during the war (September 17th).

It seemed that Lee could not be beaten by a careful general, and so a reckless

TWO NAVAL BATTLES OF THE WAR



This was the first battle of iron ships. The Merrimac was a regular frigate cut down, with a sloping roof of iron added. The turret of the Monitor revolved so that its two heavy guns could be fired in any direction. They met March 9, 1862, and fought for five hours. The Merrimac had destroyed the wooden ships Congress and Cumberland the day before, and but for the Monitor might have destroyed the Union fleet.



The most noted of the Confederate privateers was the Alabama, built and launched in England, in spite of the objections of the United States. Commanded by Captain Raphael Semmes, she almost drove the merchant vessels of the United States from the seas between 1862 and 1864. On June 19, 1864, she sailed out of the harbor of Cherbourg, France, to fight the United States vessel Kearsarge, and was sunk.

one, General Burnside, was next sent against him but was defeated with terrible slaughter at Fredericksburg, though his troops fought with wonderful bravery (December 13, 1862).

In the last months of the year there was again heavy fighting in the West, in which the Union forces were generally successful. At Perryville, Corinth and Murfreesborough, the advantage was with them, though in some cases both sides claimed the victory. But on the other hand two attempts to capture Vicksburg failed.

PRESIDENT LINCOLN SETS THE SLAVES FREE

The beginning of 1863 was marked by the Emancipation Proclamation on New Year's Day. In this President Lincoln declared all slaves in the seceded states to be free, but said nothing of those in the slave states which remained in the Union.

Still Richmond was not taken, and another general, "Fighting Joe" Hooker, was chosen to oppose Lee. The armies met at Chancellorsville, May 2, 1863. General Lee again divided his army and sent Stonewall Jackson to strike on the Union flank. The attack was successful but Jackson fell from the fire of his own men, who mistook his escort for Union cavalry, and Lee said that he had "lost his right arm."

General Lee now made the mistake of again invading the North and marched into Pennsylvania. Hooker was succeeded by General George G. Meade. The armies met at Gettysburg and for three days (July 1, 2, 3) the battle raged. The first day the Confederate forces had the advantage and the second day also, but the Union forces had thrown up entrenchments, and early on the third day were able to regain the positions which had been lost. General Lee determined to break the Union centre and sent 13,000 men under Pickett and Pettigrew to do it. The charge is one of the most famous in all history, but it failed and General Lee retreated.

THE MISSISSIPPI IS OPENED BY THE CAPTURE OF VICKSBURG

Though he had failed the year before, General Grant was determined to take Vicksburg and finally, July 4, 1863, the day after the victory at Gettysburg, the city surrendered. The Mississippi was now lost to the Confederacy. One of

the great objects of the war was entirely accomplished. Arkansas, Louisiana and Texas were cut off from the rest of the Confederacy.

In Tennessee, however, the Confederates were more successful. At Chickamauga, the Confederate General Bragg, assisted by Longstreet, whom General Lee had sent to his aid, defeated General Rosecrans and the Union army would have been entirely routed but for General Thomas, who stood firm as a rock, though he lost many men. This was on September 19, 20, 1863. The Union army was now shut up in Chattanooga and besieged there, by the Confederate troops who occupied the hills surrounding the city. It seemed that Union success in the West had been checked.

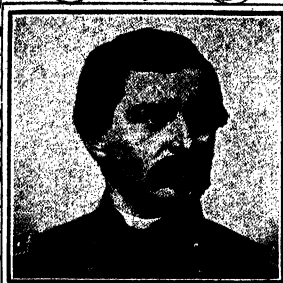
General Grant was now placed in command of all the armies in the West, reinforcements were hurried to the city, and in a series of battles, the Union forces were successful. Lookout Mountain, "the battle above the clouds," was fought on November 23rd, and the next day Missionary Ridge was also taken; and the Confederate army forced to retreat.

THE CONFEDERATE HOPES GO DOWN AFTER GETTYSBURG

Until after Gettysburg and Vicksburg, Confederate success seemed possible, and the North was growing more and more tired of the war. From that time the Confederate cause sank. Thirty thousand men had been surrendered at Vicksburg, and the veteran soldiers lost at Gettysburg could not be replaced. Nearly every able-bodied man in the Confederacy was in the army and as they dropped out from death, disease or wounds, there were few to step forward to take their places. Clothing was scarce, as there were few factories, and not many sheep in the Confederate States. There were few railroads, and these broke down as the months went on. Food could not be brought to the army, and much of the time Lee's soldiers did not have enough to eat.

With the beginning of the year 1864, a change was made in the Union plans. The armies had acted separately under orders from Washington. In the West the Confederates had been defeated, but in the East, they had been generally successful. So the man who had led the

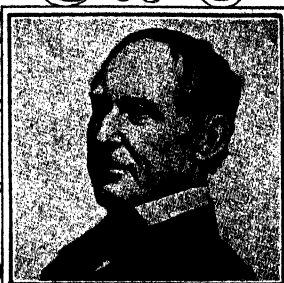
UNION LEADERS IN THE CIVIL WAR



McCLELLAN



HOOKER



FARRAGUT



THOMAS



SHERMAN



MEADE



SHERIDAN



PORTER



ERICSSON

Here are nine leaders of the Union forces. Though McClellan could not win victories he organized the army which finally won. Hooker was a good officer, but no match for Lee. Farragut took New Orleans and Mobile, while Porter helped to take Vicksburg and Fort Fisher. Meade won at Gettysburg, Sherman marched through the Confederacy and Thomas saved the day at Chickamauga. Sheridan was Grant's right hand in Virginia, and Ericsson constructed the Monitor, which defeated the Merrimac.

Western armies to victory was brought to the East and placed in charge of all the armies of the United States.

GENERAL GRANT'S PLAN TO BRING THE WAR TO AN END

His plan was simple: to keep hammering away in the East until he broke down the defences of Richmond, and to have General W. T. Sherman, in command of the army in the West, keep on attacking the Confederate army under General Joseph E. Johnston, until it had been destroyed. It was expected that the war would be ended during the summer of 1864.

All this seemed possible. The blockade of the Southern ports was now very close. Nearly every harbor was in possession of the Union fleet, thus cutting off all supplies from Europe. Mobile, on the Gulf of Mexico, Charleston, and Wilmington, which was defended by Fort Fisher, had not been taken, but fleets watched the entrances to capture blockade runners.

THE BLOCKADE RUNNERS CARRY COTTON OUT AND GOODS IN

These blockade runners were low, swift steamers painted a dull slate color in order to be as little noticed as possible. Carrying a cargo of cotton and showing no lights, they would slip out of the harbor on a dark night, and try to escape unnoticed through the blockading fleet. Once through they were seldom caught, and steamed swiftly to the British West Indies, where they unloaded their cotton and carried back manufactured articles of every kind, medicines and provisions. The return trip was arranged to approach the harbor at night. The most skilled pilots who knew every foot of the coast were in charge and many boats were able to slip through into the harbors. The profits of this trade were enormous. Cotton which could be bought in Wilmington or Mobile for a few cents a pound, in gold was worth, in England, ten to twenty times as much, and the goods taken into the Confederacy also brought large prices. Two successful trips would more than pay the cost of a boat, and even if only a few trips were made, before the vessel was captured, the owners could easily afford to buy another boat from the profits. One boat made sixty-four trips, and another, twenty-one. North Carolina owned a very successful blockade runner.

MOBILE AND WILMINGTON ARE TAKEN AT LAST

Finally, in August, 1864, Mobile was taken by Farragut, who forced his way into the harbor in spite of the torpedoes, destroyed an ironclad vessel the Confederates had built, and captured the forts. Very few vessels could run the blockade at Charleston, though the city could not be taken by the Union fleet. At last (January 15, 1865), after a heroic defence, Fort Fisher was captured by a combined land and naval attack and Wilmington was taken. The last port of the Confederacy was closed, with the exception of Galveston, Texas, which was of little use.

Though the Confederacy had no regular navy, several steamers were sent out to destroy the commerce of the United States just as the United States had done to England during the War of 1812. The most famous were the Florida, the Alabama, the Georgia and the Shenandoah, which were fitted out in British ports, though the United States declared that this was an unfriendly act which a neutral nation ought not to allow. Altogether two hundred and sixty United States merchant vessels worth \$20,000,000 were captured. All of these privateers, except the Shenandoah, were captured or destroyed before the end of the war. Later Great Britain paid over \$15,000,000 for the damage done by these vessels as it was decided that she ought to have prevented them from leaving her ports.

HIGH PRICES PAID FOR GOODS IN THE SOUTH

There was little gold or silver in the Confederacy and the government issued paper money, which soon began to lose its value, until finally it was little more than waste paper. One soldier tells of giving a month's pay for a breakfast of ham and eggs. Before the war ended, a barrel of flour cost \$1,500 in Confederate money, coffee brought from \$50 to \$100 a pound, and at the last could not be had at all. Many manufactured articles in daily use could not be bought at all. Thorns with heads of wax served for pins, matches were not to be had, salt was scarce and brought \$20 a bushel. Envelopes were made of wrapping paper or even of wall paper and when once used were turned and used again.

Now let us go back to Northern Vir-

ginia in the spring of 1864, when Grant took command of the Union armies as general-in-chief. In May with more than 100,000 men he moved forward and met Lee with about 65,000 in a thinly settled section of Virginia, known as the Wilderness, on May 5th and 6th. He lost over 15,000 men but could not drive back the Confederates. Instead of retreating as other Union commanders had done, he moved to the left to get around the Confederate army, but on May 8th again found Lee in front at Spottsylvania Court House. For ten days there was constant fighting but Grant could not break through Lee's entrenchments, though he lost many men.

COLD HARBOR, THE FIERCEST BATTLE OF THE WAR

Again Grant turned to the left but found Lee in front of him at North Anna River, where hard fighting occurred with considerable loss. Again Grant repeated his old plan, and again found Lee in front of him at Cold Harbor with defences already constructed. On June 3rd, a desperate assault was made and seven thousand men were lost in an hour. In all, the Union losses were about 10,000 while Lee lost hardly more than 2,000. Within five weeks Grant had lost about 60,000 men, a number almost equal to Lee's whole army, but as these dropped out thousands more were sent forward. Even if he lost two men to Lee's one, his force was so much larger that Lee must finally be overpowered.

It was for this reason that Grant refused to exchange prisoners. He could get plenty of new men, but Lee could not. When prisoners are exchanged they are allowed, by the rules of war, to return to the ranks and fight again. Every Confederate held in prison reduced Lee's forces. Besides this, many of the Union prisoners were not fit to fight when they came out of prison on account of the hardships which they had suffered in the Southern prisons.

After the battles described above, it was seen that the cost of breaking Lee's line was too great and Grant swung around to the south of Richmond and began to besiege Petersburg. For months little was accomplished except that supplies coming from North Carolina to Lee's army were cut off, and the Union army settled down in winter quarters around Petersburg.

SHERMAN STARTS ON THE MARCH TO ATLANTA

But what had Sherman been doing? With 100,000 men, he was opposed by Joseph E. Johnston with about 65,000. General Johnston determined not to fight hard as Lee did, but to lead Sherman further South. Sherman also was unwilling to fight unless conditions were favorable. So Johnston retreated slowly, destroying railroads and bridges as he passed. Sherman followed and whenever Johnston fortified a position would send a part of his army around toward his rear and force him again to retreat. At last Johnston withdrew into the defences of Atlanta and prepared to defend the city.

The government of Richmond had grown impatient with Johnston's caution just as the government at Washington had grown impatient with McClellan two years before. So Johnston was removed and General John B. Hood was put in his place. But if Johnston had been cautious like McClellan, Hood was as reckless as Burnside. Between the middle of July and the first of September several battles were fought and Hood was forced to give up the city.

SHERMAN'S FAMOUS MARCH TO THE SEA

Then he determined to move back into Tennessee, thinking Sherman must follow him. Sherman, however, divided his army, sent half under Thomas after Hood, and himself began his famous "March to the Sea," destroying the railroads and all provisions, shops and factories in a strip of country sixty miles wide. There was no one to oppose him for only old men and boys were left. The able-bodied men were with Hood or Lee, or in the defences of Savannah.

Hood first met a part of Thomas's army under General Schofield at Franklin on November 30th and gained the advantage, but Thomas in Nashville did not attack, much to the disgust of Grant and President Lincoln. Finally when he was entirely ready he attacked, December 15th and 16th, and almost destroyed Hood's army.

Meanwhile Sherman had continued his march toward Savannah, which he captured after a siege of two weeks and presented as a Christmas present to President Lincoln. After his men had rested for a month the army started

northward toward Columbia, which was burned. The people of the city and many others believed that it was set on fire by the soldiers but General Sherman always denied this.

SHERIDAN AND EARLY IN THE SHENANDOAH VALLEY

Now we shall leave Sherman's army for a time and see what was going on elsewhere. Lee hoped that he could force Grant to send away some of his forces from Petersburg, by threatening to attack Washington. He therefore sent General Early to Western Virginia with orders to make as great a show as possible. Early moved toward Washington, and at one time was in sight of the city. Grant sent General P. H. Sheridan to oppose Early. In several battles Early was defeated and driven out of the Valley and Sheridan then laid waste that rich region so that it was said "that if a crow wished to fly down it, he must carry his provisions with him."

THE NET CLOSES ABOUT LEE'S ARMY

Meanwhile the net was closing around Lee's army. Grant had two men to his one; Sherman was steadily approaching from the South, and then, besides, Lee's soldiers lacked food and clothing. It was plain that Richmond could not be protected any longer. The only hope lay in joining Johnston, who had again been put in charge of the forces which had been shattered by Sherman and Thomas. If this could be done, Lee intended to retreat further south, and continue the contest.

The first attempt was made March 25th, but though at first successful, the Union lines were too strong, and Grant moved a heavy body of troops to cut off a retreat. A week later Sheridan broke Lee's line at Five Forks, and captured 5,000 prisoners. The next day (April 2nd), Petersburg was attacked but could not be taken. That night Lee withdrew his men from Petersburg and Richmond. At Amelia Court House he found that a train load of supplies which he had ordered to remain there had by mistake been sent on to Richmond. His army had nothing to eat.

The Union army pressed on in pursuit, and Sheridan hurried ahead to get in front. For four days the Confederate soldiers had had no food except perhaps a handful of corn, and at last, on April

8th, Lee realized that nothing more could be done. On April 9, 1865, he and Grant met at the little village of Appomattox and arranged terms for the surrender of 27,000 men—all that were left.

Meanwhile Sherman had reached Goldsboro, North Carolina, and then moved on to Raleigh. Finally, April 26th, Johnston surrendered near the spot where the city of Durham now stands, and soon after the other forces of the Confederacy also gave up the hopeless contest.

THE END OF THE CONFEDERACY IS AT HAND

Jefferson Davis, when Richmond was given up, hastened southward, hoping to organize resistance across the Mississippi, or to escape from the country. He was captured by Union cavalry, May 10th, near Irwinsville, Georgia, and imprisoned in Fortress Monroe under charge of treason. After a time he was released on bail and was never brought to trial.

The news of Appomattox had hardly spread over the United States when the terrible tale of the assassination of President Lincoln by John Wilkes Booth, an actor, followed. This occurred in Ford's Theatre, in Washington, on the night of April 14th, and the same night an attempt to kill William H. Seward, Secretary of State, was also made. It was thought at first that some of the Confederate leaders had had a part in the plot, but it was discovered that it was a mistake. Booth escaped but was finally discovered and shot while resisting arrest.

After the surrenders of Lee and Johnston the Confederate soldiers made their way to their homes to try to make a living for themselves and their families. In many cases they found their houses and barns burned, their cattle and horses gone, the towns in ruins, the railroads and the bridges destroyed. Many who had been wealthy before the war were reduced to poverty, and found it hard work to get employment as their neighbors were as poor as themselves. The outlook for the future seemed very dark. Many of the negroes thought that freedom meant that they would not have to work, and flocked to the towns, where they expected to be taken care of. Many believed that the government would give every one of them "forty acres and a mule."

A SCENE ON SHERMAN'S MARCH TO THE SEA

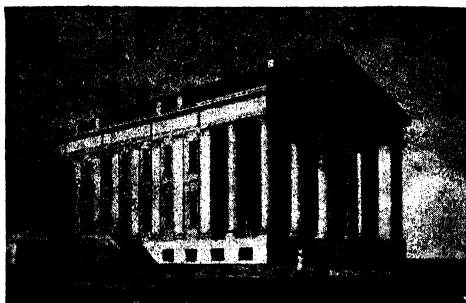


After the capture of Atlanta General Sherman determined to cut loose from his line of supplies, destroy the railroad and march to Savannah, where he could communicate with the Union fleet. The march began November 16th and Savannah was captured December 20, 1864. His march was accompanied by thousands of vagrants called "bummers," who robbed right and left. Many negroes gathered up their scanty goods and followed the army. Railroads were destroyed, mills and factories burned, and all food not used by the army was destroyed on a strip of land sixty miles wide through the heart of Georgia. There was no force to oppose him, and this showed that the Confederacy could not endure much longer. This picture was made from the famous engraving drawn by Darley and engraved by Ritchie. It shows the soldiers destroying the railroad tracks, pulling down telegraph poles and also shows the burning houses. Georgia was desolated.

THE BEGINNING AND THE END



General Grant, after gaining success in the West, was made lieutenant-general and commander of all the Union armies. You have read of his success. This picture, drawn by Nast, represents him in front of his tent in the field. He was careless in his dress.



The sessions of the Confederate Congress were held in this building, planned for the capitol of Virginia by Thomas Jefferson, who was a good architect.



In this modest farmhouse in the little village of Appomattox Court House, General Lee agreed to surrender his entire army to General Grant.



The guns fired upon Fort Sumter in Charleston harbor marked the beginning of one of the greatest wars of modern times. Firing on the fort began April 12, 1861, and here we see the little garrison in the fort replying. The fort was almost destroyed, though not a man was killed. On April 14th, Major Anderson surrendered his force. From this time both North and South prepared for war, which all felt had now begun.

WHAT WAS TO BE DONE WITH THE SECEDING STATES

The first question to come up was what was to be done with the seceding states. The Thirteenth Amendment to the Constitution forbidding slavery anywhere under the United States flag had passed Congress before the end of the war and in December, 1865, became a part of the Constitution. That much was settled.

Now the North had said all the time that a state could not secede. If this were true then these states had the right to choose their rulers, vote for President, and send Senators and Representatives to Congress, for they had never been out of the Union. Yet it was thought to be dangerous to give them this power as it was feared that they would ill-treat the negroes, pay the Confederate debt, and undo the results of the war. So several other theories about the seceding states were advanced. One was that the states had committed suicide and so had become territories again. Another said that they were conquered provinces and that Congress might treat them as it would foreign territory. The fourth idea was that they were still states but had forfeited their rights.

WHAT THE TERM RECONSTRUCTION MEANT

Andrew Johnson, who had succeeded President Lincoln, at once attempted to admit the seceded states into the Union as fast as they formed new governments. Congress would not allow this, except in the case of Tennessee. During the war a part of Virginia had been set off as the state of West Virginia. At first the South was formed into five military districts and an army officer was placed over each of them. Each state was required to make a new constitution, giving the negroes the right to vote, and to ratify the Thirteenth and Fourteenth Amendments. This was called Reconstruction. When this was done they were re-admitted to the Union. Some of the states were not recognized as members of the Union until 1870. Many white men were not allowed to vote, though every ignorant negro was given the privilege. As a result the state officers were generally negroes or Northern white men. Some of these Northern men had gone South expecting to spend their lives there, but a much greater number were greedy adventurers who cared

only for their own pockets. They were commonly called "carpetbaggers," and promised the negroes that the property of the whites would be divided among the former slaves, if they would vote for them.

As a result the government of the states was very corrupt and wasteful. Taxes were so high that the owners of land could not pay them. There was much disorder, since the former slaves did not know how to use their power, and a secret society, the Ku Klux Klan, was organized among the whites. The members rode about the country at night in disguise and whipped and even killed some of the leading carpetbaggers and negroes.

At last the white people got possession of the state governments one by one, sometimes fairly, sometimes by force or by fraud, but the memory of the "Reconstruction Days" still lives, and this is the chief reason why the South has in so many things opposed the North since the war. The anger and the bitterness caused by the war might have been forgotten, but Reconstruction was worse than war.

THE PRESIDENT IS IMPEACHED

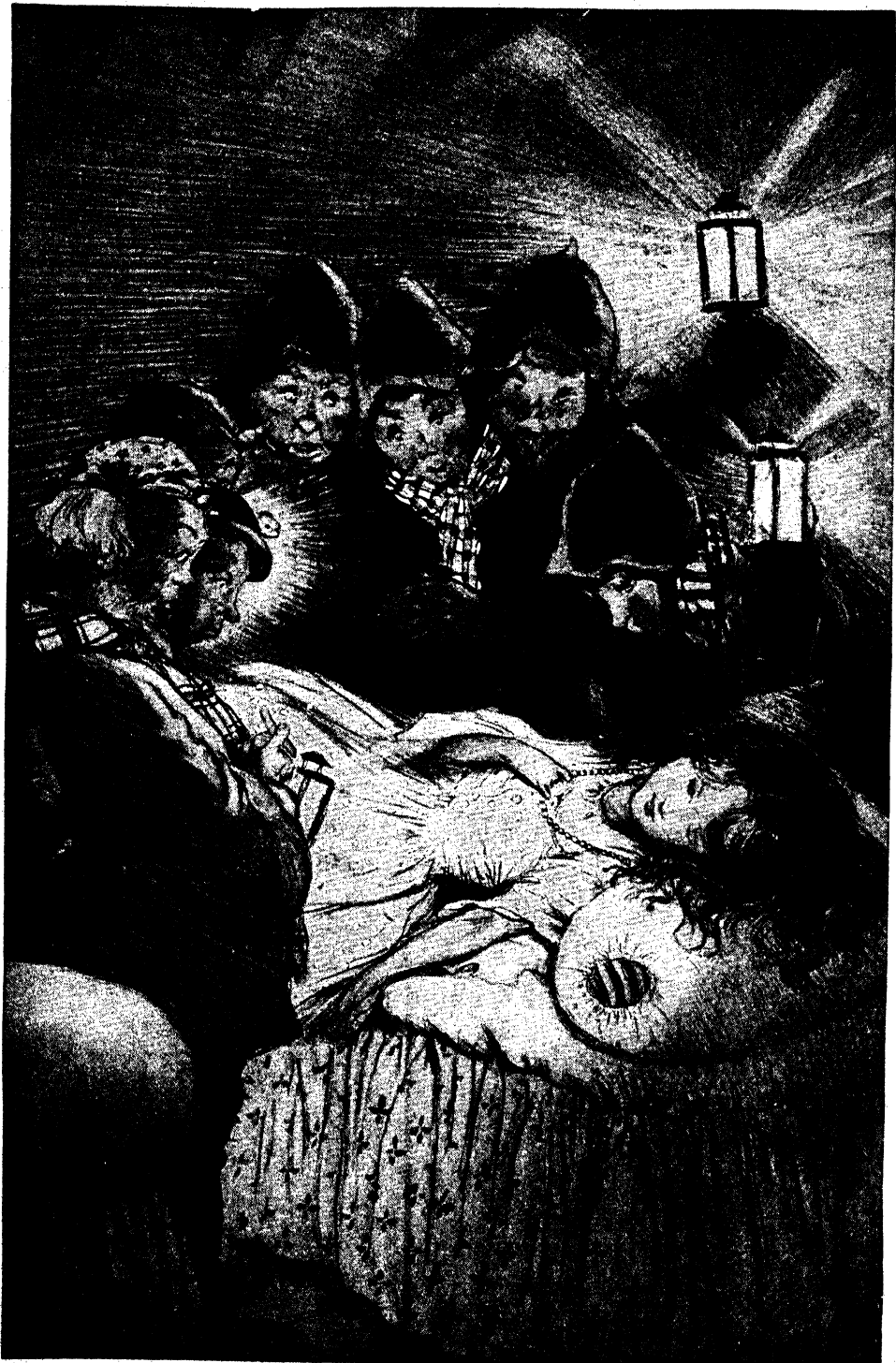
President Johnson was not liked by the Republican members of Congress, who tried to take all his power away from him, and he in turn opposed Congress in every way he could. At last the quarrel grew so bitter that he was impeached in 1868. According to the Constitution the Senators are the judges when a high officer of the government is tried on the charge of abusing his power. When the vote was taken thirty-five Senators voted guilty and nineteen not guilty. The Constitution says that to find a man guilty two-thirds must vote against him. So you see if one man had changed his vote, the President would have lost his office.

TWO SIDES OF THE WAR

In one way we may be proud of the war, no matter whether we live in the North or in the South. No soldiers ever showed greater bravery than was exhibited in many of the twenty-four hundred battles of the war. While there was much that was cruel and hard, there were many bright spots, deeds of kindness and of heroism which will live for ever.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 2147.

THE DWARFS FIND SNOWDROP ASLEEP



When it was quite dark the seven dwarfs returned, lit their seven lamps, and entered their cottage. On the bed they found little Snowdrop fast asleep. "How beautiful she is!" they exclaimed, all together.

The Book of STORIES



SNOWDROP AND THE DWARFS

ONE winter's day, when the snow lay deep on the ground, a gentle Queen sat by her window working. As she worked she pricked her finger, so that two little drops of blood fell from it. The Queen sighed and said :

"How I wish that I might have a little daughter with cheeks as rosy as those drops of blood, with a skin as white as snow and hair as black as the ebony window-frame!"

To her great delight the Queen's wish was granted, and before long a little daughter came, whom she named Snowdrop.

Soon after this the good Queen died, and Snowdrop's father, the King, married another lady, very beautiful, but very unkind and vain. She knew that she was the most beautiful lady in the land, because when she looked into her magic mirror, and asked :

"Say, glass that hankest on the wall,
Who is the fairest of beauties all?"

the glass would always answer :

"Thou, Queen, art fairest of beauties all."

As the years rolled by little Snowdrop grew into a very sweet and lovely girl, and one day when the vain Queen asked the glass the old, old question, to her great surprise it replied :

"Fair and lovely though the Queen,
Snowdrop lovelier far, I ween."

This sent the jealous Queen into such a frightful rage that she immediately summoned her servants and gave orders for Snowdrop to be killed.

CONTINUED FROM 1995

But all the people in the castle loved Snowdrop, and, instead of killing her, one of them, a good, kind girl, took her into a wood and there left her, in the hope that somebody might see her and befriend her.

Left alone, poor Snowdrop wandered about in the wood until she came to a little cottage. She opened the door and went in. Inside she found seven little beds, seven little loaves, and seven little glasses of wine. She ate a good supper, and then, being very tired, she lay down and fell fast asleep.

Now, the cottage belonged to seven dwarfs, and when it was quite dark they returned, lit their seven lamps, and entered. On the bed they found a lovely maiden asleep.

"How beautiful she is!" they exclaimed, all together.

At this Snowdrop awoke and sat up in bed.

"Do not be afraid," said the dwarfs, "for you are among friends. But, tell us, how came you here?"

Then Snowdrop told her story, and the dwarfs, who were charmed with her beauty and sweetness, offered her a home.

"But," said they, "be careful to keep the door fast while we are away lest the jealous Queen find you and do you harm."

Sure enough the Queen did find out where Snowdrop was, and, dressing

herself up as an old woman, she set off for the cottage. Presently Snowdrop heard somebody calling :

"Fine wares to sell! Fine wares to sell!"

She opened the window and leaned out, and indeed the ribbons and laces that she saw before her were so pretty that, forgetting all about the dwarfs' warning, she unbolted the door and ran out.

"I think I will buy some laces," she said.

"Let me fasten them into your dress for you," said the old woman, who at once set to work to tie them so tightly that little Snowdrop fell down as if dead.

"There is an end to all your beauty," said the wicked Queen.

Soon the dwarfs came home, and they no sooner saw Snowdrop than they guessed what had happened. Quick as lightning one of them drew out a knife and cut the cruel lace. In a few minutes Snowdrop revived and related her story. When they went away the next morning the dwarfs again warned Snowdrop to open the door to nobody until they returned.

Late in the afternoon Snowdrop looked out of her window and saw a strange old woman in a red shawl with a basket on her arm.

"Fine wares to sell! Fine wares to sell!" she called.

"What have you to sell?" asked Snowdrop.

"Come to the door and I will show you," answered the old woman.

"I dare not," said Snowdrop. "But, oh, what beautiful combs!"

"Try one on," said the old woman, handing one in at the window.

Snowdrop took it in her hand, but the comb was poisoned, and when it touched her hair she fell down as if dead.

Soon the dwarfs came home. They saw the comb and drew it out, and immediately Snowdrop revived.

As soon as the wicked Queen learned that Snowdrop had escaped her a second time she painted her face, dressed herself as a peasant, and went again to the cottage. This time she took with her a beautiful apple which she had filled on the side with poison.

"Would you like this pretty apple?" she said, holding it up to Snowdrop as she leaned out of the window.

But Snowdrop was wise now, and would not take it.

"Perhaps you think it is poisoned," said the old woman. "See, I shall eat the white side and you shall eat the red."

The apple did look very tempting, and as the old woman had eaten of it it certainly could not be poisoned, thought Snowdrop. So she put out her hand, took the apple and put it to her lips. But no sooner had she taken one mouthful than she fell down as if dead.

Then the Queen returned to the palace, and, taking her magic mirror in her hand, asked :

"Who is the fairest of beauties all?"

This time the mirror answered :

"Thou, Queen, art fairest of beauties all."

Then the Queen knew that at last Snowdrop was dead.

At dusk the dwarfs returned to the cottage as usual, but this time all their efforts to restore her were useless. Snowdrop was dead. Sorrowfully they dressed her in a beautiful robe, and placed her in a crystal box ornamented with gold, and set it on a hill for everyone to see.

One day a Prince passed that way, and he was so struck with Snowdrop's beauty that he paid the dwarfs a large sum of money to allow him to carry it away. As it was lifted down one of the servants stumbled and fell. The door of the crystal box flew open, the piece of poisoned apple fell out of Snowdrop's mouth, and she revived and sat up.

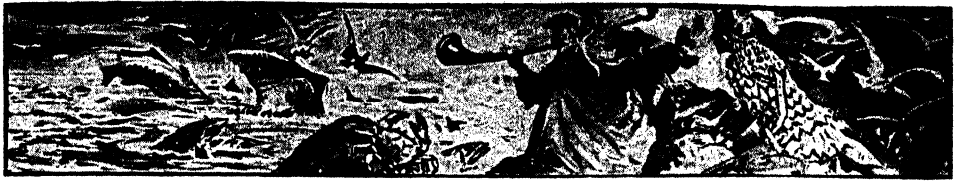
"Where am I?" she asked.

The Prince, who was overjoyed to find that the beautiful lady was still alive, came forward and helped her down. He had learned the story of the jealous Queen's wickedness from the dwarfs, and so he was able to tell Snowdrop what had happened.

"I love you better than anyone in the world," he said, when he had told her all. "Come with me and be my bride."

Snowdrop smiled and gave him her hand, and went away with her Prince to his father's palace, where they married and lived happily ever after.

The Queen was invited to the wedding ; but she was so furious that the Prince's love had brought Snowdrop to life again that she fell down in a fit, from which she never recovered.



THE LAND OF YOUTH

THERE was once a Czar of Russia who fell ill of a disease which no doctor can cure, but an aged woman said to him:

"Oh, Little Father, when I was very young I heard of a land called the Land of Youth. In that land is a fountain of the water of life. Send one of your sons to get some of that water for you."

The Czar gave his eldest son, Prince Michael, a great sum of money, and asked him to go in search of the Land of Youth.

Prince Michael departed, but the first place he reached was the City of Pleasure and he went no farther. Then the Czar sent his second son, Prince Peter, but Peter met his brother in the City of Pleasure, and stayed there also.

Prince Vladimir, the youngest son of the Czar, then wanted to go, but the Czar feared that his two elder sons had perished, and he did not want to lose his last child. Vladimir, however, grieved to see his father grow weaker and weaker, so one night he also secretly set out to get the water of life.

He passed by the City of Pleasure and entered a vast wilderness, which took him twenty days to cross, and came to a great sea. By the seashore he found an old, old woman, and he asked her the way to the Land of Youth.

"I am a thousand years old," she said, "and I have never heard of such a place. But perhaps my friends know."

She went down to the shore and blew upon a horn, and the water was churned into foam by the multitude of fishes that came to her call. No fish, however, knew of the Land of Youth. But as Vladimir was going away a whale came hurrying up.

"Can you take this handsome lad to the Land of Youth?" said the very old, old woman.

"Certainly," said the whale, "if he will wait till midnight. The Fairy of the Fountain and her two dragons will then be asleep."

So at midnight Prince Vladimir got on the whale's back, and was swiftly carried to the enchanted land. He stole to the fountain where the fairy slept beside her dragons, and filled two flasks with the magic water. But he saw the fairy's face, and was so moved by her strange beauty that he resolved that when he had cured his father he would return and try to win her love. In order that she might know him, he placed round her neck a chain of jewels with a locket enclosing his portrait.

Then he traveled back on the whale to that old, old woman, and gave her one of the flasks, and she drank the water and became a beautiful maiden. He then crossed the wilderness, and showed the other flask to his brothers in the City of Pleasure.

But Michael and Peter killed him and themselves took the flask to the Czar, and said that Vladimir had been slain.

Their father drank the water and became young again. He was so grateful that he proclaimed that Michael should rule over Northern Russia, and Peter over Southern Russia. But as he spoke two dragons rushed up through the air and killed the wicked brothers. On one dragon sat the fairy, on the other sat Vladimir.

Having fallen in love with Vladimir's portrait, the fairy had set out to find him, discovered his body and restored it to life with the magic water. She now told the Czar why she had killed his two elder sons, and then led Vladimir back to the Land of Youth, where the two lovers still live together, ever young, ever loving, and ever happy.



IN THE DAYS WHEN MEN WERE GOOD

IN the days when all men were good they were given a miraculous power. Lions, mountains, whales, and forests, and birds, rocks, clouds, and seas, moved quietly from place to place, just as men ordered them. Every man was then a real king of the earth, and all living creatures and lifeless things obeyed him. But the human race at last lost its miraculous power through the laziness of a certain man. He was a Bulgarian woodman, and one morning he went to a forest in the Balkan Mountains and cut firewood.

"Now march off home," he said.

The great bundle of wood at once got up and began to walk, and the woodman tramped on behind it. So far, so good. But the woodman was a very lazy man.

"Now, why shouldn't I ride instead of tramping along the dusty road?" he said to himself.

And he jumped up on the bundle of wood as it was walking in front of him, and sat down on top of it. But the bundle of wood then refused to go. The woodman got angry, and began to strike it fiercely with his axe. But all in vain. And suddenly the heavens opened, and a terrible voice cried out from the sky:

"Man! You have been lazy and wicked, and, instead of being carried by your bundle of wood, you shall carry it yourself on your shoulders."

And from that time the human race lost its power, and no longer did everything move at its command.

THE MAGIC PEN OF TRUTH

JACK LINDON saw it in a Japanese shop in Atlantic City. It was a lovely pen made out of green jade, with a golden nib engraved with curious signs.

"I'll buy that for Letty," he said.

To his surprise he found that its price was only a quarter.

"I got it very cheap from a lawyer," said the Japanese merchant. "He said that it had ruined his business."

Jack gave the pen to his pretty sweetheart, Letty Ferrars, and she used it in writing her love-letters to him. But one evening, alas! the lovers quarreled. Letty went home, and seized the pen and wrote Jack an angry letter, saying

that she did not care for him, and would never see him again. But in the letter that Jack received she said:

"Dearest Jack,—I'm very sorry we quarreled. I love you still with all my heart. Come and make it up, or I shall be unhappy."

For the pen was enchanted. It wrote down what the writer really thought and not what the writer pretended to think. On receiving the letter Jack ran to Letty's house. She said she did not want to see him, but when he showed her the letter written with the pen of truth, she kissed him, and soon afterwards they were happily married.

THE PRINCESS OF THE IVORY CASTLE

ONE day, when the Emperor of China was out hunting alone, he stopped on the bank of a stream to drink, for he was thirsty. But as he stooped to raise the water in his hands, he started back, for he saw reflected in the stream, the face of a beautiful maiden. Thinking that she stood behind him, he looked around, but—there was no one there.

Again he looked in the stream. Again he saw her face. Again he gazed around. There was no human being in that solitude except himself. It was a mystery, and he sought the wisest of the mandarins, and commanded them to solve it.

"That," said the oldest mandarin of all, "is the Princess of the Ivory Castle, but no one knows where the castle is."

"Find it," said the Emperor, imperi-

ously. "No one but the princess shall be my wife."

Three years were vainly spent in searching for the castle. But at length the Emperor, who was once more hunting alone, came upon a little lake, and in the lake he saw reflected—an ivory castle. He looked around, but the hills were wild and bare.

"How foolish I am!" he exclaimed. This is what I should have done when first I saw the Princess."

So saying, he sprang to the bottom of the lake. There he found the castle, and in it sat the Princess, waiting for him, for she had seen his reflection in the stream and loved him. Then he led her to his palace and married her, and they lived happily ever after.

HOW THE FRENCH REACHED MOSCOW

IT is a fine thing for an army in a foreign country, which has marched and starved and thirsted for many weeks, to see at last a great city raising its spires in the air, and sending the smoke from thousands of happy chimneys into the wide dome of the sky.

Such a sight as this met the Grand Army of Napoleon in Russia. And the city was Moscow.

NAPOLÉON'S MARCH THROUGH THE SILENT STREETS OF A SPLENDID CITY

After desperate battles, after heroic marches through the most wild and desolate country, thirsty, hungry, wounded, and weary, the French soldiers beheld the magnificence of the Russian's holy city flashing and sparkling in the air.

No Russian army disputed their approach. They marched towards this great city, which was crammed with merchandise, provisions, and wealth, as if it were their own Paris. Not a shot was fired. Not a soldier was to be seen. What had happened?

The truth is that, as Napoleon approached the city at one end, the Russian soldiers were marching out at the other.

So it came about that Napoleon marched at the head of his great army into this magnificent city, and found no one to stop him. The Russian people could hardly believe that it was Napoleon. They were taken completely by surprise.

The wife of a priest was sitting at her window knitting a stocking when the deacon's wife came running to her with the news that Napoleon had come. The priest's wife called to her husband, who was writing in the next room, "Do you hear this? Napoleon is here!" The priest did not stop writing. He laughed. "Do not be stupid," he answered; "go and make the tea." No one believed that Moscow had fallen.

THE GREAT MYSTERY OF MOSCOW AND ITS AWFUL DOOM

The French soldiers could not understand the silence. The city was deadly still. Street after street was passed and nothing happened. The bands of their army played "The Victory is Ours," but no one came to listen or to sing. The soldiers looked up at the windows of the houses, half expecting shots to be fired at them; not a face stared out

at them. They began to feel a little frightened.

In an hour's time the awful, the terrible, the unwriteable horrors of plunder had begun. Can you not imagine what it must be when thousands of starving and thirsty soldiers are turned loose in a rich city filled with unarmed men and women? You can imagine some of the horrors; but, thank God, you cannot imagine all. We dare not write them down.

Soon, very soon, the splendid city of Moscow was filled with horror. Shrieks of "Murder!" rose from every street. People were seen running wildly, with blood upon their faces, crying, "Murder, murder!" the soldiers pursuing them.

Nothing was sacred—not even the holy women who give their lives to the poor. Churches were plundered. Treasures of art were destroyed. Sacred things were thrown to the fire. A mad and drunken soldiery went hither and thither, bursting into private houses, running up the stairs, entering the rooms of the sick, the dying, and the dead, stealing and murdering, behaving like wild beasts.

There was but one cry in the city—the scream of "Murder!" The poor people of Moscow found themselves in the power of evil.

THE BEAUTIFUL CITY OF MOSCOW BECAME A VAST BONFIRE

Suddenly a cloud of smoke rolled upward into the darkening sky, and a thin tongue of scarlet flame licked through it, dancing in a shower of sparks. Then the same thing occurred in another quarter of the city, then in another. The smoke rolled upward, the flames shot through the clouds.

"Our soldiers are setting fire to the places they have sacked," thought the French generals. "We shall have to be careful. To-morrow we will see to it. Let us go to the theatre to-night."

But it was not the French soldiers. It was the Russian people. The citizens of Moscow were burning their own city, the sacred city of Moscow. They had no arms; they could neither resist the French nor avenge the dreadful things done to their wives and children; but they could burn the city, and leave the French to perish.

While the work of murder went on, the flames crept forward. The soldiers drank—the city burned.

In a very short time great districts were nothing more than gigantic bonfires. Churches and palaces quivered in sheets of flame. The noise was like a whirlwind. The heat was like a furnace. In streets far away the stones became so hot that they burned through leather soles. The gutters were filled with leaping floods of molten copper and lead, streaming from the roofs of churches and houses. French soldiers sought to check the conflagration.

For four nights they toiled—four nights in which no lamps or candles were needed, so vivid was the light of the victorious flames. Shrieks of "Murder!" still issued from the houses. Women and children still ran screaming from their butchers. Old men were still beaten to their knees in the streets. Nuns and Sisters of Mercy still tore hither and thither to escape the soldiers. Little boys and girls still ran and hid in cellars. Everywhere still sounded the terrified shrieks and screams of the poor Russians. But louder than their shrieks roared the great fire; and fiercer than the French were the scorching flames which leaped from roof to roof, from street to street, from square to square like a tempest of fire.

A wind blew hard on the flames, and fanned them as a blacksmith fans his furnace. The noise was deafening. The heat singed the hair on the face, cracked the lips, and suffocated the

lungs. On and on came the fire. With bellow like thunder, the mighty roof of a cathedral crashed down, and up whirled a black mass of smoke, pierced presently by a thousand tongues of scarlet fire.

Glass melted and ran with streams of lead through the streets. Trees burned away like matches. Houses of wood vanished in one lick of the red flames. On and on. No one could stop it now. The wind blew victory to the flames.

And Napoleon began his retreat.

Suddenly in the midst of the clamor there came a bursting roar, which shook every stone in the city and deafened the ears of the people. The great arsenal had exploded. People went mad from that shock. Palace walls were split as an axe splits a log.

Outside Moscow, Napoleon was marching away with his army, back over the thousands of desolate miles he had already come. He turned at the sound of the great explosion, and looked with wrath at the smoking ruin.

In Moscow he had counted to find provisions for his troops, and then to advance again, from victory to victory.

Now he was retreating from a heap of cinders. Fire had driven him back.

He turned his head and continued the retreat. The way was long. No cities broke its monotony. And there on that long path, waiting to destroy him, waiting to seize him with hands of ice, and breathe upon his brain the deadly cold of despair, was Winter, White Winter, the other wing of the destroying angel who is Flame and Snow.

THE WANDERING SHEPHERDESS OF THE MOORS

IN the days of King George the Third, all the beaux of Exeter vainly waited for a sign of love from Maria Selwyn, the gentle, beautiful heiress of Squire Selwyn. But Maria had already given her heart to a handsome shepherd, and she used to steal out at dawn and meet him in the silent meadows.

But one unhappy morning the old squire, who had also risen early, saw the two lovers sitting together under a tree. The sight drove him mad with anger, and he had the shepherd lad attacked, and the next morning Maria found her sweetheart nigh to death.

"All I have in the world, dearest, are my sheep. I leave them to you. They shall follow you," he said, as he died.

The girl was crazed with grief. Her father shut her up and hunted the sheep away; but she got out of the house, and began to wander aimlessly about England, and the sheep followed her.

At last she crossed the Scottish border with her strange flock, and perished on the wild moors near Kingswell. After her death her sheep would neither eat nor move. They pined away, and some kindly Scottish peasants buried them around their mistress.

THE THREE MAID-SERVANTS

HEARING that a farmer's wife wanted a maid-servant, three girls came to her house to get the place.

"Now," said her husband, "I will show you how to choose a good servant."

He placed a broom across the path leading to the farmhouse door, and he and his wife watched the girls as they came along. The first girl kicked the broom aside, and the farmer said: "She's an idle lass, and won't bend her back."

The second girl skipped over the broom.

"She won't do," said the farmer. "She'll skip her work."

The third girl picked up the broom, and put it in a corner out of the way, and the farmer said:

"That's the girl for me; she is tidy, careful, and hard-working."

So this girl was chosen for the place.

MOTHER SHIPTON

IN the year 1488 a very strange little girl was born in a cottage by the Dropping Well at Knaresborough, in Yorkshire. She had a long, hooked nose and a turned-up chin, and her eyes were like the eyes of a wise old woman.

She was sent to school only once, and then she showed the schoolmistress that there was no need to teach her the alphabet; for she at once read off with the greatest ease the most learned books that could be found in the parish. But she did not show her very wonderful gifts until after she was married to Toby Shipton. Then one of her friends lost a new smock and petticoat, and came to her for help.

"Go to the market cross next market day at noon," said Mother Shipton, "and you will see what you will see."

Her friend did so, and at noon a woman came to the market cross with the smock and petticoat, and cried aloud:

I stole my neighbor's smock and coat;
I am the thief, and here I show't.

And after making the confession in the sight of all the people, she gave back the things to the rightful owner.

The fame of Mother Shipton soon spread throughout England, and she moved from Knaresborough to York,

and Cardinal Wolsey sent the Duke of Suffolk to ask her to prophesy about him. And Mother Shipton said:

"The Cardinal will see York, but he will never come to it."

"If he does come to York, he will burn you for false prophecy!" said the Duke.

Mother Shipton took her handkerchief and threw it into the fire, saying: "I will burn when that burns!"

And though the Duke of Suffolk stirred up the fire, and thrust the handkerchief right into it, the handkerchief would not burn.

Cardinal Wolsey then came to Cawood, which is only eight miles from York, and climbed up the tower and looked at the city, and someone told him of Mother Shipton's prophecy.

"I will go to York at once, and burn her for a false witch!" said the proud Cardinal.

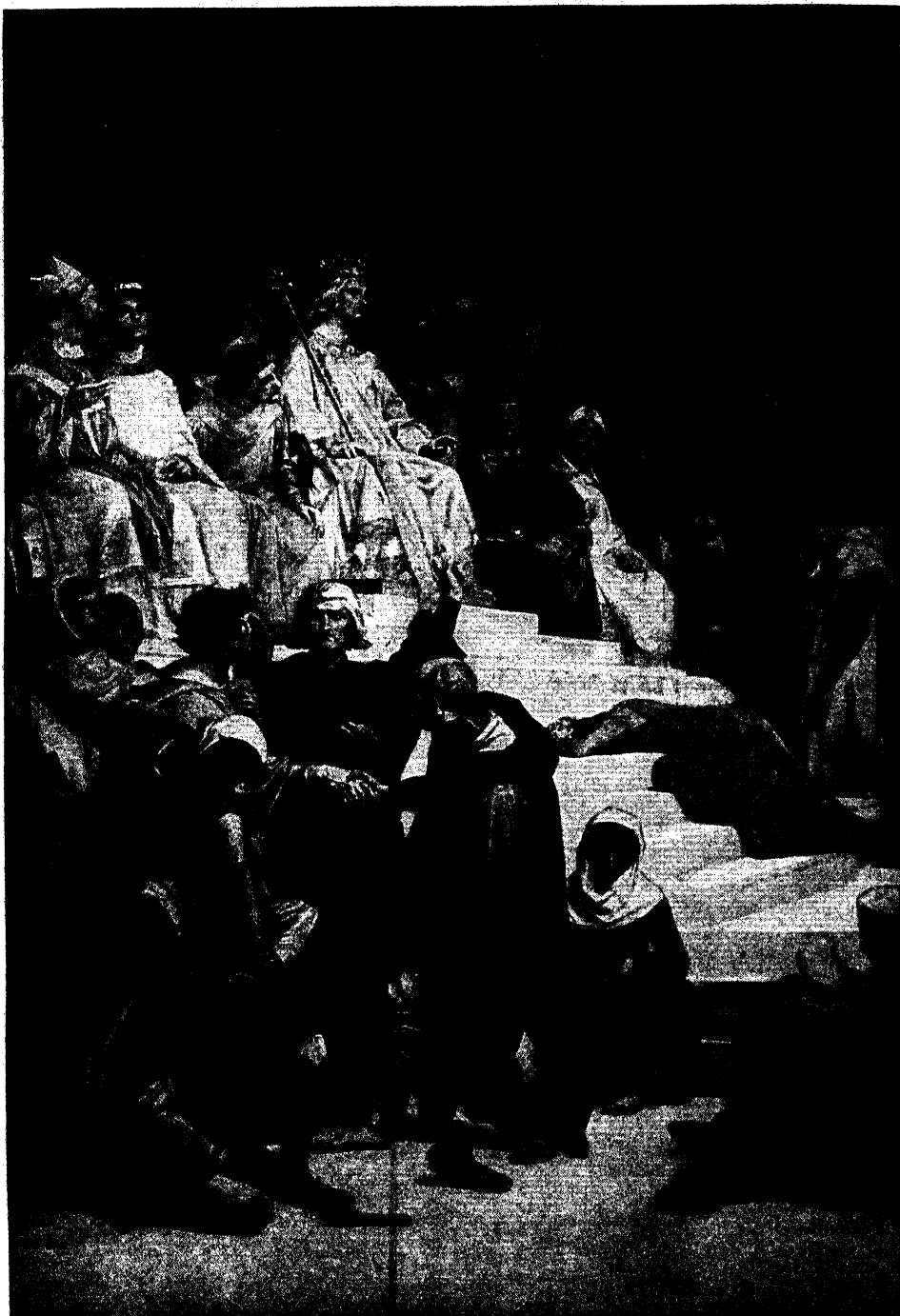
But just as he was setting out for York he was arrested on a charge of high treason by King Henry, and he died as he was being taken to be tried at London. Mother Shipton lived to a great age, but many of the stories told of her are invented by modern writers.

THE NEXT STORIES BEGIN ON PAGE 2175.



KNARESBOROUGH, THE HOME OF MOTHER SHIPTON

LOUIS IX. OF FRANCE ON HIS THRONE



Louis IX., usually spoken of as Saint Louis, was one of the best kings of France. He made good laws, which show remarkable humanity for the time in which he lived, and he established a court of justice in Paris, where he was not afraid to try the rich and powerful nobles who oppressed the poor peasants by making them work for little or no pay. He also founded hospitals and a great college. He was the highest type of ruler in the world at the time he lived. He was a devout Roman Catholic, but is no less admired by Protestants.

The Book of ALL COUNTRIES



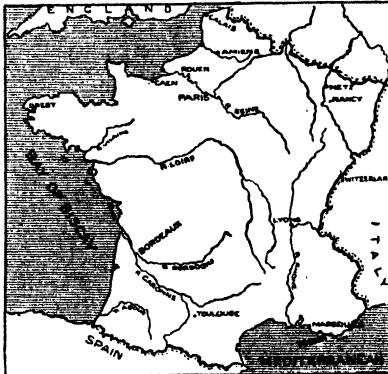
Looking out from the English Embassy on the Terror of St. Bartholomew's Day in Paris

THE BEGINNINGS OF FRANCE

AS the English boy looks over from Kent towards the shadowy cliffs that are the edge of the great Continent of Europe beyond, it is hard to realize that once upon a time there was no channel of ever-restless, dancing waves to part his corner of it from his nearest neighbor, France. But so it was in the times of the "very beginnings," for the same sorts of tools, the same sorts of bones are found north and south of the Channel. The wild men who made and used the tools, the wilder animals whose skeletons have been dug up and put together again, must have roamed freely over the lands that were then united.

Then, ages after the great western ocean had thrust long arms over the sinking land, and separated the country we now call Great Britain, Ireland, and France, another race of men spread over the now divided countries, and raised great stone monuments such as we may see to this day at Stonehenge in Wiltshire, at Carnac in Brittany. As we come nearer to the dawn, we find that still the dwellers on the south are very much like those on the north of

CONTINUED FROM 1936



the separating waters, with their Druid priests and mistletoe boughs, and tools of bronze. It was the great Cæsar himself who began the written history of the Gauls, as he called the people whom he found in the country now known as France. It was the success that he had in subduing them that made him anxious to push across the Channel to the white cliffs of their

British cousins. As time went on, Roman civilization spread in Gaul even more than it did in Britain, and many are the remains of villas, temples, and theatres scattered over the country which the soldier nation held for centuries. By means, too, of the fine roads—which the Romans built everywhere—traders passed right through the country, from the Mediterranean to the Channel, and then across to the "island in the mist" beyond.

Yet more the Romans did for Gaul; for when they could no longer hold the country, they left behind them a lasting influence on its speech, laws, customs, and religion. The Romans, after bitter persecution at first, had supported Christianity so strongly

in Gaul that it was never wiped out again as was the case in Saxon England.

Tribes of the same German family as the Angles and Saxons, who conquered Britain about the fifth century, gradually pressed into Gaul across the Rhine, and also into the Rhone Valley, and they managed to get more and more of the Gaulish lands for themselves.

HOW CLOVIS SET UP A KINGDOM OF FREE MEN AND CALLED IT FRANCE

One tribe proudly called themselves the Free Men, or Franks, and in the end their chief, Clovis, gained the country north of the River Loire, and called it Francia. He made his capital on a little island in the Seine, where already there had been a settlement. That little island is now the heart of the beautiful city of Paris, and on it stands the Cathedral of Notre Dame. Clovis married a Christian wife, who persuaded him to give up his old heathen religion.

What a wonderful scene it must have been, as Clovis and some 3,000 of his stalwart, long-haired warriors gathered round the saintly old Bishop Remigius, who baptized them on Christmas Day, 496, saying: "Adore what you have burned, and burn what you have adored."

Wild and bad times came after his death, full of enthralling stories of wicked queens and good bishops, strong soldiers and weak kings. The monasteries, as in the early troubled times in England, were the centres of peace. Scholars assembled in them to learn and study and to pray, and to write precious manuscripts—such as we can see now in the museums—which were then the only books.

THE COMING OF CHARLES THE GREAT, THE HERO-KING OF FRANCE

After a long line of "do-nothing" kings a strong man rose up to withstand a great invading army of fierce Saracens, men who were followers of the Prophet Mahomet, and were the destroyers of civilization and Christianity. At the great battle of Tours, which saved Europe from bondage, Charles, the leader of the Franks, beat about with his heavy battle-hammer all through a long autumn day, till his men thought of the old god Thor of their ancestors, and called him Charles Martel, Charles of the Hammer. His grandson, Charlemagne, or Charles the Great, is one of the heroes of France,

as Alfred the Great is of England. Like Alfred, he cared much to make good laws and govern his kingdom well, and to encourage people to learn and study. A thoughtful and good monk, Alcuin, went over from England to help him. He did much to improve trade, and by establishing fairs brought people together, and so helped them to know each other, and overcome foolish dislikes and prejudices.

Egbert, often called the first King of England, stayed for some time at the Court of Charlemagne, and learned much that helped him to bring the rest of the small kingdoms under his leadership when the time came. For Charlemagne's great ambition was to rule over a great dominion, and all his life he was busy drawing together the different states in the country, conquering wild tribes beyond his borders, doing battle with the Moors in Spain, and, in the end, he more than doubled the kingdom he had inherited.

WHY TEARS CAME IN THE KING'S EYES AS HE LOOKED FROM HIS WINDOW

Part of his army, under his friend Roland, was attacked and overwhelmed when passing through a valley in the Pyrenees on their way back from the war in Spain, and this formed the subject of a great poem, "The Song of Roland," which was sung and recited all over the west of Europe for centuries. When Taillefer, the minstrel, about 250 years later, led the Normans to the battle of Hastings, which we read about on page 589, his song, taken up by the whole army, was about the valor of Charlemagne's knights in this song of Roland.

There is a story told of Charlemagne looking out from his window on the Mediterranean and seeing the boats of the Northmen on the blue sea. They had come all the way from Denmark, and other northern countries. We read on page 464 how they were dreaded in England, and how they ravaged and burnt on all the coasts. Charlemagne's eyes, we are told, were filled with tears as he watched the long, swift boats, and said to those about him: "I do not fear them for myself, but woe to those who come after me."

Within a hundred years what the great Charles had dreaded came to pass. His empire was divided up, in

the reigns of his weak descendants—the Meek, the Fat, the Simple, the Fool are some of their nicknames—and the dauntless Northern pirates and rovers pushed up the Seine and the Loire, plundering first and then returning to settle. Charles the Simple followed the example of Alfred by giving them part of his kingdom, so that the rest might be left in peace.

In Rouen, the old capital of Normandy, there stands a statue of Rollo, the first of the Norman dukes. He stands proudly pointing to the soil, and



the words that are written on the base are "J'y suis, j'y reste," which mean "I am here, I stay here." There is a story told of him when he had to do homage to Charles the Simple for his newly gained lands. It was his part to kneel before the king and kiss his foot.

"Never will I bend my knee to anyone nor kiss his foot," cried Duke Rollo, with blazing eyes. At last he was persuaded to let one of his warriors do homage for him. The Northman seized Charles's foot so roughly that the poor king fell over back-

THE BAPTISM OF CLOVIS, THE FOUNDER OF FRANCE



CLOVIS II., THE BOY KING, RECEIVING THE HOMAGE OF THE CHIEF RULERS OF HIS TRIBE
Clovis, who was chief of one of the heathen German tribes of Franks, or Free Men, who settled in Gaul, founded his capital on an island in the Seine on which the cathedral of Notre Dame now stands. He married a Christian and embraced her faith. Above we see him being baptized by Bishop Remigius on Christmas Day, A.D. 496. In the lower picture we see Clovis II. at the age of five. He ruled over 100 years after Clovis I., and became king of all the Frankish tribes who had settled in France,

This picture is reproduced by permission of Messrs. Braun, Clement & Co.

wards, amid the loud laughter of those standing by.

As soon as the Northmen entered into quiet possession of the pleasant and rich country now called after them—Normandy—they settled down to cultivating it, became Christians, built churches and cities, and before long spoke the tongue that had become the language of most of the country from the time of Charlemagne—French, founded on the Latin of the old Romans.

**THE FIRST FRENCH KING OF FRANCE,
WHOSE HOUSE RULED 800 YEARS**

Charlemagne himself spoke a German dialect, but he had to learn French, and the oldest written document in it is the oath taken by his grandson in the treaty which marks the beginning of the three great kingdoms of Italy, Germany, and France.

We have seen in the story of Great Britain how William, Duke of Normandy, only six generations after his forefathers had settled on the south side of the Channel, determined to add England, on the north of it, to his possessions. We have seen, too, how he did it, and how England in consequence became mixed up with the quarrels and wars of the Continent through having kings who were also dukes of Normandy, and also what troubles arose later by English kings marrying French princesses, who brought large provinces in France as their marriage portions.

It was not, however, till the end of the tenth century that it could be said, "France has a French king." Hugh Capet, Count of Paris, was then chosen king by the great nobles who ruled over the various independent provinces acknowledging the king as overlord, and his descendants ruled France for eight hundred years.

**THE FIGHTINGS OF THE FEUDAL LORDS,
AND THE SORROWS OF THE POOR**

Hugh's royal dominions were only a twentieth part of what is now France, and for many centuries the powerful feudal lords were constantly rebelling against the Crown or fighting each other. This state of things made it very wretched for the poor, who were serfs, bound to work on the soil or fight for their masters. There were often terrible famines in those days, and sore was the want and oppression that prevailed all over the land.

One can fancy some of these poor creatures hanging on the edge of the excited crowd, listening to the eloquent preaching of the French monk who had returned from the Holy Land with sad tales of Jerusalem in the hands of the Mahomedans. When he urged his hearers to go and fight them, the tears rolled down their faces, and they shouted again and again: "Dieu le veut," which means "God wills it." As we have read on another page, this enthusiasm spread to England, and princes and knights, even the lion-hearted king himself, and thousands of English workers badly needed at home, took part in the Crusades to take Jerusalem from the Turks.

One of the best of the French kings, Louis IX., whom we read of on page 1548, went twice to the Crusades. He made good laws, and founded hospitals and a great college, and established a court of justice at Paris, where the rich and powerful could be called to account for wrong doing.

**HOW THE BARONS SOLD FREEDOM TO GET
MONEY TO SET JERUSALEM FREE**

These rich and powerful nobles tyrannized terribly, not only over the poor country folk, but over the people who were better off in towns; for the towns, too, belonged to them, and they could make the citizens grind their grain and bake their bread just where they chose, and make them pay just what they chose for having it done; yet they gave them no voice in electing their own magistrates or settling the laws and taxes, and no freedom in trade.

Now, one of the good results of the Crusades was that in France they hastened the freedom of the cities, for often the barons who owned them wanted money so badly to go to the war that they had to sell to the citizens the rights they so much desired. Sometimes the king would help the citizens against the nobles in the struggle that went on and on through the centuries.

Many of the earlier kings of the House of Capet were weak, at a time when the Norman kings of England were great and powerful, as we learned on page 589, so they were able to hold a large part of France. But when the strong Philip Augustus determined to increase his power, John the Coward was not the man to withstand him. By degrees Philip conquered Normandy and many

CHARLES THE GREAT AND HIS PUPILS



Charles the Great is one of the hero-kings of France, as Alfred the Great is of England. He gained a large dominion ; but, above all, he encouraged people to study, having pupils of his own, as we see in this picture.

other lands held by John in France. Indeed, it almost seemed as if Philip would gain England too.

Some years after the English patriot, Simon de Montfort, of Norman birth, began to take the first difficult steps towards forming a House of Commons, where the people could be represented, the King of France called a National Assembly to meet in the Cathedral of Notre Dame, in Paris. To this were bidden not only the nobles and clergy, but, for the first time, the representatives of the citizens. But these members

never got so much power as the English Commons, and the French kings only called the "States General" thirteen times in 500 years. Absolute power was slowly and surely gathered more and more into one hand as the years rolled on.

We have seen on page 772 that it was wretched enough for England, during the long Hundred Years' War with France, to have thousands of her strong men sent overseas to be killed, or to die of disease, or to come back ruffians, hardened to killing and stealing. But

for poor France, where all the battles were fought, where towns were besieged and plundered, where the country was laid waste and provisions and treasures stolen, it was indeed terrible, and we can realize how widespread was the misery as we think again, looking at the map, about the "thunder of God" at Cressy, the "snowstorm of white arrows" at Poitiers, the tears of the gentle queen at Calais, the fine Court of the Black Prince at Bordeaux. There is an old song still sung about the pleasant fields and orchards of Normandy, of which the chorus runs: "Jamais, jamais, jamais, les Anglais ne régneront sur nous," meaning, "Never, never, never shall the English reign over us." It dates from these wars when Edward III. tried to become King of France, and, indeed, called himself so, and added the white lilies of France to his coat of arms.

THE ENGLISH IN FRANCE, AND THE SAD STORY OF JOAN OF ARC

In a later chapter of this sad war comes the romantic story of the successes of King Henry V., owing to the disunion of France and the madness of her king. Henry regained much of the French land that had been lost, but, even if he had lived, he could not have kept the throne, which had only been offered to him by the nobles in a fit of passion against the Dauphin, the true heir to the kingdom. We read on page 774 how Henry died at Paris, and was buried at Westminster.

In the disturbed times that followed his death, when the fortunes of France were at their lowest ebb, owing to the weakness of the Dauphin, afterwards Charles VII., there stands out the wonderful story of Joan of Arc, which we read on pages 774 and 1311. She was so persuaded herself that God called her to deliver her country that she succeeded in persuading others too; and we see the simple peasant girl, transformed into a leader of rough soldiers, on her white horse, with a white banner in her hand, so inspiring them with her enthusiasm and goodness that their courage revived, victory followed victory, and the French king was crowned triumphantly at Rheims, Joan, with her banner, standing by. It was a black and shameful day when Joan was buried by the English as a witch at Rouen, after the French

and their ally had given her up to them. She had saved France, but its king held out no hand to save her from her cruel enemies.

THE NEW WEALTH AND THE NEW IDEAS THAT CAME TO FRANCE AND EUROPE

At the Field of the Cloth of Gold, about which we read on page 857, the host of the brilliant party was Francis I., the first French king who ruled over the country from sea to sea, united under the royal power. The long wars against a common foe had made men act and suffer together. Formerly each baron had lived apart in his own strong castle; now Francis I. gathered them to his Court, and all sorts of extravagance and gaiety became the custom wherever the Court was held.

France came in for her share in the great fortune that fell about this time to the old European world. Gold and silver to make coins could be had in plenty, trade began to flourish, new thoughts and ideas rose in men's minds as the New World and the new learning came in sight.

The new religion did not take hold of the mass of the people as in England. In spite of long and bitter disputes with the Pope during the Hundred Years' War, the greater part of the people remained firm Roman Catholics. Protestants were called Huguenots, and were bitterly persecuted from the first. Calais, the only possession in France left to the English at the end of the Hundred Years' War, was taken by the French during the reign of Henry II., the son of Francis I.

THE WICKED MOTHER OF 3 KINGS, AND THE TERROR OF ST. BARTHOLOMEW'S DAY

Catherine de Medici, the wife of Henry II., was a very clever but wicked woman, the mother of three kings of France whose reigns dwindled miserably away, the result of their bad and idle lives.

The eldest, Francis II., was the husband of the beautiful and unhappy Scotch princess, Mary Stuart. We know how sadly she left her beloved France after her young husband's death (we can see the picture on page 861), and what a miserable life was hers as Queen of Scots! Francis II. was followed by his brother, Charles IX. In his reign was the terrible massacre of St. Bartholo-

KINGS OF FRANCE AMONG THE PEOPLE



Louis XI. was in some ways a good King of France. When he came to the throne his country was almost ruined by the Hundred Years' War. He strove to find out everything about his subjects, rich and poor. He was so earnest about this that he used to go alone and visit his peasants in their homes, as we see in this picture by Mr. J. Seymour Lucas, R.A., given here by his permission.



This picture shows how gentle and thoughtful for his poor peasant subjects Louis XVI., who was guillotined in the Revolution, could be. He was very unfortunate in coming to the throne when he did, as his grandfather, Louis XV., had ruled very badly and had taxed the poor terribly. For the first two years of his reign Louis XVI. tried to carry out reforms, but a big war with England, and the influence of his queen, Marie Antoinette, rendered his efforts at reform useless, and the French Revolution broke out.

mew's Day, when the Huguenots were suddenly murdered, it is said, to the number of 2,000 in Paris, and 20,000 in France altogether. It was Catherine who planned this dreadful deed. The quarrel was not altogether on account of religion. The Huguenots were in a way also a political party, and some of their leaders were more interested in securing power for themselves than they were in advancing religion. For years the contest distracted France and did much harm. This was in August, 1572. This sixteenth century was full of cruel persecutions in the name of religion both in England and France, and in the latter country were also years of wretched civil wars on the same account.

It is a relief to turn to Henry IV., called the Good, the friend of Queen Elizabeth and the hero of the battle of Ivry. He had sympathy with the poor, having been brought up in the country in a simple way, among peasants.

A POPULAR KING, A FAMOUS CARDINAL, AND SOME VERY BAD WOMEN

One of Henry's best deeds was to allow liberty of worship to the Huguenots, by the Edict of Nantes. This was a whole century before England allowed real freedom to those who differed from the established religion of the land. Henry was brought up a Huguenot, but turned Roman Catholic after he became king. "Paris is well worth a mass," he said in joke to his friends.

His wife, Marie de Medici, was not a good woman. Their daughter, Henrietta Maria, married Charles I., and her bad upbringing caused much unhappiness in England. Henry had a clever adviser, Sully, and with his help got the money affairs of the kingdom into order and reduced its tremendous debt; he also made roads and canals, and encouraged manufactures, agriculture, and commerce, and France was very sad when he was killed by a madman in the streets of Paris.

A great Minister, Cardinal Richelieu, did a great deal for France in the years that followed. He protected commerce and tried to keep order among the nobles, destroying their castles, reforming the government in the provinces, and taking away some of the old powers of the nobles and giving them to the Crown. He did all he could to strengthen the

power of the king, and did his best to increase the dominions of France and lessen the power of Spain.

THE AGE OF GRANDEUR, AND THE PALACE WITH 4,000 SERVANTS AND 5,000 HORSES

After him came the "age" of Louis XIV. This king reigned over seventy years, and during his long lifetime he saw, the terrible Thirty Years' War on the continent, and across the Channel the stirring times of the Stuarts, the execution of Charles I., the Commonwealth, the Restoration, and the following sovereigns down to George I. In the struggle of the English people against the tyranny of the Stuarts, Louis XIV. took the side of the kings, and when James II. had to flee the country, Louis helped him with money and soldiers, and at last gave him a home till he died.

Many learned men and great poets lived in this age, and as French was much spoken all over Europe, their works were widely read, and made people think and study. It was an age, too, when France spread beyond her own borders across the ocean, where years before bold Breton fishermen had crossed and started the great trade in cod. Now devoted Jesuit missionaries followed Cartier and other explorers, not only on the St. Lawrence and great lakes, but down the length of the Mississippi, naming Louisiana, at its mouth, after the king, as we read on page 278.

It was an age, too, of great works at home—roads, canals, and buildings. It took twenty years to build the huge palace of Versailles and to turn the barren lands about it into a splendid park, by planting thousands of trees and bringing water by canal from a distance to form lakes and streams and waterfalls. It sounds like a fairy tale to read of the 4,000 servants, 5,000 horses, 10,000 soldiers of the guard.

THE GROWING VANITY OF VERSAILLES, AND THE GROWING MISERY OF THE POOR

Hundreds of courtiers all gathered about this enormous palace, where fêtes were held of extraordinary magnificence. What Francis I. had begun a hundred years before in forming a gay Court to live always about him, Louis XIV. carried on in the most lavish way. He made his Court the most splendid in the world, and insisted on his nobles leaving

A STORY OF A TERRIBLE DAY IN FRANCE



This picture, one of the most expressive ever painted by Sir J. E. Millais, tells a story of the terrible eve of St. Bartholomew, 1572. It is called "Mercy," and represents a good nun beseeching a Catholic not to obey the summons of a monk beckoning to him to come and massacre the Huguenots, who were the Protestants of France. The Catholics tied a handkerchief round their arms and wore a cross on their hats to distinguish themselves from their victims, and all the houses of the Huguenots had been marked with a white cross. All night long the horrible slaughter lasted, and on through the next day, until 2,000 Huguenots in Paris had lost their lives. Following the example of Paris, the Catholics throughout France rose and massacred 20,000 of these poor people. The cruel Catherine de Medici planned this terrible massacre.

their estates in the country and living at Versailles, where they had nothing to do but stand around and watch the king at his toilet, or at his pleasures, and join in the dancing, play-acting, gambling, and hunting which filled up the time. In the meantime, the lot of the peasants on the estates grew worse and worse, and throughout France unjust taxes were wrung from the people to pay for the extravagances of Versailles.

This age of Louis XIV. was also celebrated for great generals, as well as for great writers, great expansion abroad, great luxury and want at home; for wars were constantly going on with Spain, Holland, and England. Often these great generals gained most brilliant victories, which set France for a time at the height of her glory. But towards the end of the long reign, Marlborough and his allies, as we saw on page 1043, stopped the increase of the power of France, which so alarmed the rest of Europe, by winning battle after battle. When the old king lay dying, his great armies were destroyed, his fine ships were battered hulks, and treasures of precious lives and hardly-gained money had been poured out for naught.

Many of the wars were about religion, for Louis hated Protestants, and treated the Huguenots with such cruelty that all who could escaped to other lands, to the great loss of France, for these God-fearing, industrious people carried away with them their skill in manufacturing, to increase the prosperity of other countries through the silk and woolen trades.

Such was the state of misery to which the country was brought by famine and oppression that a great archbishop wrote to Louis: "The whole of France

is one great hospital, a hospital without money." But the king only mocked; he cared not so long as he could get money for his wars and palaces, and he could not see that France was like a great gilded statue, with the wood inside all decayed. One of the sayings of Louis—the little man with high-heeled shoes and large wig—was this: "L'état c'est moi," meaning "I am the State"; and it expresses his ambition to be absolute master of everybody and everything.

When he died, lonely in the midst of state, the people waited, rejoicing and feasting, on the road to see the body of the grand monarch pass by to the royal tomb at St. Denis.

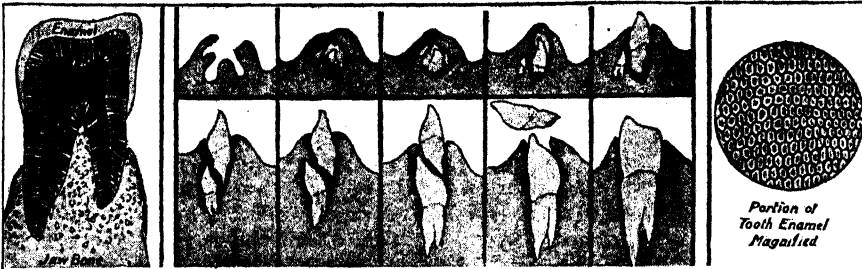
His great-grandson, who followed, cared for nothing but his own wicked pleasures, and during his long reign France lost Canada and her influence in India. Commerce was checked, and the state of the people was piteous indeed. Money was dragged from them for the king to spend in disgraceful luxury. He and a few nobles bought up all the grain in the kingdom, so that all must pay their exorbitant prices or starve. There was a gloomy dungeon prison in Paris then, the Bastille, and into it people were flung without trial or reason, men and women alike. The king used to sign orders for sending people there, and give or sell them to his favorites to fill in the name of anyone they wished to get out of the way. Many very clever men wrote at this time attacking all this cruel oppression of the people. Sometimes these books were burned, and the writers shut up in the Bastille; but their words sank into the hearts of those who read them, and the rumblings of the coming storm could be plainly heard.



This picture shows how England was joined to France thousands of years ago, before the western ocean spread itself over the land that now lies at the bottom of the North Sea and English Channel. Men and animals then wandered freely from England to France.

THE NEXT STORY OF FRANCE IS ON PAGE 279.

The Book of OUR OWN LIFE



The pictures in the centre show how the teeth grow. We start life with the roots of two sets of teeth, the first set growing until the second and stronger set pushes it out

THE MOUTH AND THE TEETH

AS every living thing burns, every living thing must feed, or its body will be consumed. This is equally true of plants and animals. There are plants which catch insects by leaves that fold up when they are touched, and in these cases the leaves act very like the mouths of animals. But in any case the leaf of a plant is its mouth, since part of its food—its gaseous food—is taken from the air by it. The liquid food of a plant is taken by its roots; so we may say that it has two sets of mouths, according to the two kinds of food that it lives upon.

In the humblest animals, such as the amoeba, the eating is done by any part of the surface of the cell—which is the whole body of the animal. We saw on page 1021 that, when the amoeba approaches something fit to eat, a sort of mouth appears, just for the occasion, on the side of the amoeba next what it wants, and so the particle of food is "swallowed."

But it is not long in the history of animal life before we find a permanent mouth appearing as a definite part of the structure of the animal's body.

When we come still higher, to the animals that have backbones, there is never any mistaking the mouth. These animals, we know, have their bones or skeletons *inside* their bodies, whereas an animal without a back-

bone, like a lobster, has its skeleton outside its body.

The backboneed animals have heads consisting of two parts which we can always distinguish, the skull and the face. The face has openings in it for the entry of air and food—openings which we call nose and mouth; and the bony skeleton of the face always includes two strong bony arrangements which we call the jaws. The upper jaw is always fixed to the rest of the face and skull. You never move your upper jaw when you speak or when you bite. You can only move it as part of the whole head. But the lower jaw hangs from the skull, and is movable. The jaws are very strong, and the movement of the lower jaw *upwards* is controlled by very strong and large muscles, for purposes of biting.

Further, whether the food be grass or whether it be the body of some other animal, it must be torn and cut and crushed, and so we find that there appear in the jaws things called teeth. These appear first in fishes, and we can prove that they really develop from an infolding of the skin round the mouth. They are really skin structures like nails, as we have seen. But in the course of animal development they have become fixed in the jaws. If you can get a glimpse of the open mouth of a tiger, you will see what a magnificent machine, for power and effectiveness, has been

CONTINUED FROM 1984



made by this combination of jaws and teeth. The jaws of a tiger cannot always be seen, but a cat is really a kind of small tiger—at any rate, a tame cousin of the tiger—and if you look at the jaws and teeth of a cat you will see the same wonderful arrangement as the tiger's, only on a rather smaller scale.

The oldest and first birds, we know, had teeth; but no kind of bird now living has teeth. The beaks of a bird correspond to our teeth and lips.

THE MANY KINDS OF TEETH AND THE WORK THAT THEY DO

Teeth are of many different kinds—some are for catching and tearing, like the long teeth of the dog or cat; others are for spearing, like the long teeth of the elephant, which we call its tusks, and the beautiful hard outside of which we call ivory. Others are for poisoning, like the poison-teeth of snakes, which have a channel running through them for the poison which the snake makes in glands behind or beside its jaw. And most of the animals that have teeth have teeth for crunching, munching, and grinding. These are usually behind, of course, while the sharp teeth that catch or bite, or spear or poison, are in front, where they will be most useful.

The teeth of different kinds of animals are a very good guide, even if we have nothing else to go by, to the habits of the animal the jaws belong to. You would not expect a cow to have the same kind of teeth as a tiger. The study of the teeth of animals is of great value in understanding how animals are arranged in classes, and also how different kinds of animals are related to each other. All human beings have the same number of teeth—to begin with—and the teeth are of exactly the same kind, and the same number of each kind.

HOW THE TEETH HELP US TO UNDERSTAND THAT ALL KINDS OF MEN ARE ONE

This is one of the arguments against people who used to declare that "savages" and negroes are very different from ourselves, and are somehow descended from different kinds of creatures from ourselves. Also the oldest human skulls we can find anywhere—some of them going back more thousands of years than you can realize—show the same arrangement of teeth as all human beings do still. This exact arrangement is different—though not very different—

from that found in any other kinds of living creatures except the highest monkeys or apes. The kinds of apes which are most nearly similar to man have the same arrangement of teeth as he has. In the lower monkeys the arrangement is slightly different.

As everyone knows, we have two sets of teeth. In the first set we have twenty, and in the second set thirty-two. The first teeth of the first set begin to appear about the sixth or seventh month after we are born. The first teeth of the second set begin to appear at about the age of six; and the last four of the thirty-two do not show above the gums until we are nearly grown up, which is when we are supposed to be wise, so they are called "wisdom" teeth. The number of teeth in each jaw, and on each side of each jaw, is the same. The flat front teeth are called incisors, or cutters; the corner teeth, canines, because these are the teeth so big in dogs; and we may call all the rest molars. The last molar on each side of the two jaws is a wisdom tooth. There is no doubt that the teeth and jaws of human beings are growing smaller and weaker. In many people the wisdom teeth never appear at all.

THE HISTORY OF OUR TWO SETS OF TEETH, AND THEIR NAMES

Of course, the reason is that teeth are getting less and less important as man gives up, one after another, his animal ways of doing things. Now we can choose and cook our food, and though good teeth are always a blessing, yet people may live happy and useful lives even though they have lost all their teeth.

The teeth of upper and lower jaws are not set exactly opposite each other. Thus, if a tooth is lost, the tooth that corresponds to it in the other jaw is not made useless for the rest of the person's life. It still meets part of a tooth next the one that has been lost. This peculiarity in the arrangement is a most valuable one. But for it, to lose one tooth would mean really losing two.

When our teeth are formed they do not grow any more. If they are properly used they remain healthy. This principle is true of every part of every living thing, and it is important that we should understand how to keep our teeth in good condition.

THE MOUTH AND THE TEETH

In some animals the teeth grow and grow, but wear each other away, so that they do not get too long. If the tooth of such an animal is lost by accident, the tooth opposite it will go on growing, with nothing to wear it away, and may force the mouth of the animal open until it cannot eat, and it dies of starvation.

Animals that live on other animals always have sharp, tearing, long teeth. These animals are called *carnivorous*, or flesh-eating. Animals that live on grass, and so on, are called *herbivorous*, or herb-eating. They often have no tearing teeth at all, but merely munching, grinding teeth. An animal like a rabbit, which is a *rodent*, or "gnawer," has gnawing teeth.

It is a very interesting question to decide, by studying his teeth, the kind of food that man is really meant to eat; and we are helped by studying the apes which still exist on the earth, though they will doubtless soon die out. We find that these apes live on fruits and the like, *not* on the flesh of other animals; and their teeth, which are practically the same in every respect as ours, are not suited for killing and tearing. Our own teeth belong to the *not* carnivorous type.

If all our teeth are perfectly sound, or properly filled by the dentist when they have decayed, sweet things will not make them ache. All sound teeth are completely covered, in all the part that shows above the gum, by a layer of what we call *enamel*. This enamel has no nerves in it, and therefore cannot feel. The case is quite different, however, when any part of the enamel of the tooth has been slowly melted away by the acids which microbes produce in our mouths. The part of the tooth underneath the enamel is called the *dentine*. It is much softer than the enamel, so that things can pierce some little distance into it, and it is filled with tiny branches of the nerve that goes to each

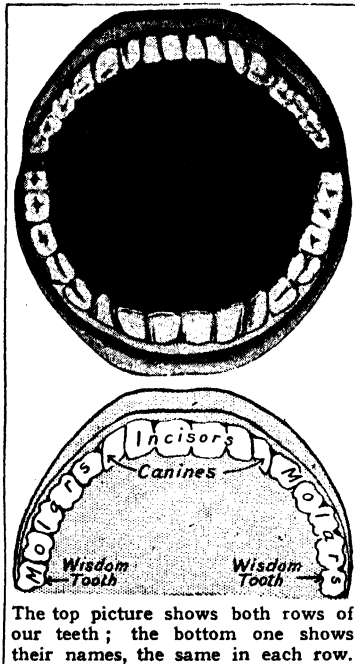
tooth. These nerve-ends are not disturbed by most of the things we eat, but sugar is one of the things that excite them, and so, if any of our teeth have their dentine exposed, we are liable to get toothache.

Very often it may be only one tooth that has its dentine exposed, yet the whole of that side of the jaw, or nearly the whole of it, may ache. The reason is that all the nerves going to the teeth along one side of either jaw are branches of one nerve, and when any part of it is disturbed, all the teeth to which its branches are distributed are apt to become the seat of pain.

We know that only very rarely indeed do the teeth of animals decay, and we know also that among savages the teeth decay no oftener than they do among animals. But our teeth are very different, and there must be something in our way of life which explains the reason. In the first place, the teeth of many of us are not well made to begin with; the enamel is thin and soft and not smooth enough, so that it cannot resist damage so well as it should. The reason is probably that many of us are not properly fed when we are babies. Perhaps our mothers could not feed us, and we were fed on

food which was thought to be good, but really was not. Babies and children who get plenty of fresh milk—and a little cream, too—have better teeth when they grow up than other people. And another cause of the decay of our teeth is the kind of food that we eat after they are formed. Animals and savages eat very hard and fibrous food, whilst some of us actually cut the crust off toast. If we give our teeth no work to do, they are bound to become weak, for it is a universal law of all life that anything which is not used, or has its work done for it, gets weak and helpless.

We should take care of our teeth by not forgetting to give them work to do.



The top picture shows both rows of our teeth; the bottom one shows their names, the same in each row.

I do not mean that we should try their powers on things like hard nuts, but that we should not be afraid to use our teeth on food instead of cutting it up too much with knives.

IMPORTANCE OF KEEPING TEETH CLEAN AND THE BEST THING FOR CLEANING THEM

Then we must be sure, every day of our lives, and especially at night, to keep our mouths clean. If we do not do this, microbes will grow in our mouths and will form acids, especially one called *lactic acid*, such as is found in sour milk, which is able slowly to dissolve the chalk in the enamel of our teeth. Our saliva fortunately interferes with this acid by using it up, since our saliva contains what is called an alkali, and an alkali, when it meets an acid, combines with it. It is better that the acid should combine with the alkali of the saliva than with the alkaline chalk of the teeth. So we should keep our mouths and teeth clean by using a tooth-powder which is itself alkaline, and is also *antiseptic*, or poisonous to microbes. We should use this powder night and morning. We should not use too hard a tooth-brush, which may wear away the teeth or make the gums bleed, and we should move the tooth-brush up and down, so as to clear the spaces between the teeth, and not from side to side.

A powder is always better to use for the teeth than a liquid, provided that it is a perfectly soft powder, without any grit that would scratch the tooth-enamel. A powder is best because it helps, by mere rubbing, to keep the teeth free from the brown stuff called "tartar," which is apt to cling to them. The best powder is a mixture of some good antiseptic and prepared chalk to be bought a pound at a time. It is very cheap indeed. It is quite soft, it is very antiseptic, it is strongly alkaline, and it is very pleasant to use. None of the things which are advertized for the teeth are nearly so good, and the cheapest of them is ten times as dear.

WHY SUGAR IS NOT BAD FOR CHILDREN IF THEY ARE HEALTHY AND CLEAN

It is very important to know whether, in order to preserve our teeth, we should avoid sugar, for all children like sugar and sweets, and if these things are good for them, yet bad for their teeth, we shall hardly know what we ought to do.

It is true that the lactic acid made by microbes in our mouths, which is apt to dissolve the tooth-enamel, is made from sugar. One molecule of sugar is split up by microbes into two molecules of lactic acid.

But if we are careful about the cleanliness of our mouths, which is even more important than the cleanliness of the skin, we need not fear that our teeth will suffer, for the microbes that produce this change in sugar can only thrive in a mouth not kept clean.

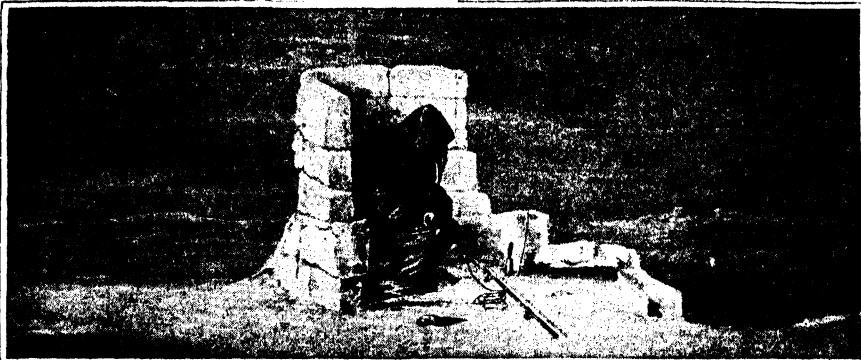
People used to think, not so very long ago, that sugar was not good for children, and Herbert Spencer was the first to argue that this opinion must be wrong. I fancy people thought that a child's liking for sweets and sugar was just greed, and they were all the more sure of this because a child that has been deprived of sugar is sure to eat too many sweets, and may make itself ill when it gets the chance. But it is not likely that the answer can really be no, when we consider that every child likes sugar naturally. Perhaps Nature is not so foolish as we think in implanting this liking in children; perhaps it is we who are foolish in thinking Nature foolish.

THE CHILD'S APPETITE FOR SWEETS MAY BE THE SIGN OF WHAT IS GOOD FOR US

And now we know that sugar is one of the most valuable of all foods. All the starch that grown-up people consume—or children, though not little babies, for they cannot digest starch—is turned into sugar before it enters the blood, and more than half the total energy of the body is derived from the burning of sugar. Now, children need a great deal of energy supplied to them in their food, because they are very active, and because, being very small, they need to produce a lot of heat to keep them warm, as their small bodies very easily and quickly lose their heat. Therefore all children need a great deal of sugar, and a child's appetite for sweets and sugar is not a mistake made by Nature, nor a sign of greed in the child, but the proper sign and demand for what the child specially needs. People who believe this find that children who get what sugar they ask for do not take too much, are not greedy, but stop when they have had enough.

THE NEXT PART OF THIS IS ON PAGE 2171.

The Book of WONDER



The Ice Age at the present day in Greenland

WILL THE ICE AGE COME AGAIN?

THE answer to this question is probably "Yes," but it is one that is very much discussed by students of the earth, whom we call *geologists*, from the word "ge," which is Greek for the earth; and no one can be certain of the answer so long as we are not quite sure what was the cause of the Ice Age of the past.

There seems to be no doubt that there were at least three Ice Ages in the past, if not five. What we need is to find out why the northern half of the earth was so cold that the great ice-cap that now exists round the North Pole spread far down over Europe. Perhaps some change in the angle at which the earth is tilted towards the sun had something to do with this difference of climate; and it may very likely be that this change is one which slowly comes and goes, and comes and goes again, at very long intervals in the history of the earth. If that is so, we shall probably have an Ice Age again, not once, but many times over; and civilization will be driven to the south. Also, there is bound to come an Ice Age at last, when the earth gets very cool; and then men must live mainly near the Equator, where the rays of the sun fall straight to the earth, and so keep it warm.

CONTINUED FROM 2011



IF SNOW IS FROZEN
RAIN, WHAT IS HAIL?

Both snow and hail are made of water, as we see when they melt. Snow, we know, is water which has frozen in the form of very beautiful, flaky crystals. These, of course, are ice-crystals, and if the water had not frozen it would have fallen as rain. But hail is also made of ice-crystals, or water-crystals, as we might equally well call them; and the difference between snow and hail is not a chemical difference at all—that is to say, not a difference of composition—but merely a difference in the way the crystals have formed as the water was frozen in the sky, and in the way in which the crystals cling to each other.

It seems to be probably a *very sudden* cooling of the air when it contains a great deal of water-vapor that causes the crystals to form as hail. That, perhaps, is why we commonly get hail in summer and snow in winter, as the air usually holds more water-vapor in summer, and may therefore get more suddenly cooled by a cold wind than it does when it is dry.

HOW CAN IT SNOW AND RAIN
TOGETHER?

This seems rather a puzzle, as both snow and rain are made of water, and water must be solid at one tempera-

ture and liquid at another. There can only be one explanation, and that is certainly the true one. The rain must have been formed at one temperature—that is, above the freezing-point of water, which is called 32 degrees on the thermometer scale, named after its inventor, Fahrenheit; and the snow must have been formed at another temperature, below the freezing point of water. This may quite easily happen, as the temperature of the air varies at different levels. In such a case as this, then, the snow and the rain have been formed at different levels differing in temperature, the one below and the other above the freezing-point of water; and the snow, in falling, has not had time to be warmed so much as to melt.

WHY DOES BLOTTING-PAPER ABSORB INK?

It is mainly a question of the surface of the paper. A very hard, very smoothly glazed paper will scarcely absorb any ink. If we write on such a paper, the ink takes a long time to dry; and what makes the writing is simply a layer of the solid matter left by the ink, that lies on the outside of the paper, and can almost be scraped away.

All other papers absorb ink to some extent. Ordinary paper, such as these words are printed on, absorbs a good deal. The drying of the ink means that the water of it has evaporated into the air, while the solids that were dissolved in it remain in or on the paper. But a paper of loose texture, with a rough, unfinished surface, like blotting-paper, absorbs ink just as a sponge sucks up water; and the water of the ink, instead of mainly remaining on the outside of the paper until it dries, runs into the substance of the paper, according to the amount of ink we use. That is why the letters are not sharply defined when we write on blotting-paper.

WHEN IT LIGHTENS AND THE SKY OPENS, WHY DOESN'T SOMETHING FALL OUT?

People who study words and sentences tell us to beware of what they call the "double question"—a question which has another question hidden in it, and the hidden question assumes what is not true. When it lightens the sky does seem to open, certainly. I remember well, said the Wise Man, seeing the sky seem to open during a storm when I was a child, and thought I saw

the "great white throne" of which it speaks in the Bible. But this is only because the sky is usually dark during a storm, and the bright lightning makes us fancy that we are looking through the sky at something beyond. Summer lightning on a bright night does not give us this notion. The sky, then, does not open when it lightens, and so there is no reason why anything should fall out. The sky is not a solid thing that holds up something above it, but is really endless space. If there were no air, the sky would seem quite dark and deep all the time, except where we saw the sun or moon or stars; but the air reflects the blue part of the sun's light, and so makes us think we are looking at a great blue dome stretched over our heads.

WHY DO SOME PEOPLE GET BALD?

Probably the chief reason why some people get bald is that we do not trust our hair to do its natural work. Hats interfere with the ventilation of the scalp, and the hair is poisoned, as plants would be if we kept them in a hot-house and never changed the air. All our clothing should really be loose enough to allow of free ventilation, and it should be made of something that allows the air to pass through it. That can be said of very few hats and caps. Another reason why hats injure the hair is that they fit tightly on to the head, and so squeeze the blood-vessels that carry to the scalp the blood by which the hair is nourished. A hat, by squeezing the arteries, starves the hair, and, by squeezing the veins, it interferes with the return of blood from the scalp, which gets filled with stale blood.

These are the reasons which mainly explain why so many civilized men get bald. Then, as the hat has destroyed the hair, we find that we *have* to use a hat to protect ourselves from the sun. The unnecessary hat destroys the hair, and so becomes necessary. Women do not get nearly so bald as men, and the reason probably is that their hats do not interfere so much with the ventilation of the scalp, and that they are attached to the hair instead of being jammed upon the head itself, so as to spoil the proper circulation of the blood through the scalp.

WHY SHOULD OUR CLOTHES BE LOOSE?

All our clothing, from head to feet, should be worn loose for several reasons.

Tight clothing interferes with the movements of the body, and this is specially serious not merely for the man who wants to run a race, but for everyone, as we must all breathe. Anything tight worn upon the trunk of the body interferes with the movements of deep, easy breathing, and injures our health. I hope no girl who reads this book is so foolish as to squeeze her waist by tight clothing, and so seriously injure her health and her future appearance. Tight clothing is bad also because it interferes with the proper circulation of the blood through the body.

Many foolish people suffer from cold feet because they wear boots so tight that sufficient blood to keep the feet warm is simply unable to get into them. Such people almost deserve to have cold feet, and corns and chilblains, and all the other unpleasant consequences of wearing footgear that is too tight. The proper way to keep warm is by our blood, not by cotton or leather, and the way to help the blood to do its work is to give it room to flow instead of tightening the veins and stopping it. Yet most of us are so anxious to look smart that, even if we learn the terrible price we have to pay, we go on doing foolish things all the time.

WHAT CAUSES CHILBLAINS ?

I am afraid we all know what chilblains are, but most of us have no experience of frost-bite. Yet chilblains are really a very mild kind of frost-bite, which people who live in such a country as Canada have to beware of ; and they are due to the same cause as frost-bite.

Cold is the beginning of it, but it is not merely the cold that does the harm ; it is really *starvation*—starvation of a finger or a toe, or the nose, or the ear, because it is not supplied with enough blood ; and the cold acts simply by shutting up the blood-vessels, so that the toe, or whatever it is, is starved. In what we call a chilblain, the toe or finger is by no means starved of blood. On the contrary, it is warm and red. But it *has been* starved, and now it has an extra supply of blood in it to make good the damage.

The surest way of getting chilblains is to wear very tight boots or gloves, to take no exercise, to get exposed to cold, and to keep hands and feet warm in cold weather by holding them before a

fire, allowing them to get really cold before or after doing so. Children are specially liable to chilblains, because their tissues are delicate, and will not stand a little starvation, even for a short time, so well as the tissues of a grown-up person.

HOW DO STONES GET INSIDE FRUIT ?

This question, and many like it, is answered if we watch what actually happens in Nature. We find, then, that what we call fruit, such as a cherry or a plum, is the last stage of a long series of changes that happen in the flower of the cherry-tree or the plum-tree. After these flowers have been fertilized—which means made fertile, or capable of producing something—they begin to change. If we look on, we may think that the flower is dying. The beautiful petals fall off, not because any harm has come to the flower, but because the petals are no longer wanted.

Then a little hard thing, with a tough skin, appears ; and that is really the fruit. But at this stage it consists of hardly more than the stone and the skin covering it. But there is a layer of very active cells, which lie between the stone and the skin, and they produce the flesh of the fruit, for which we prize it. Birds prize it, too, and so they eat the fruit, and in so doing carry the stone away with them. If it is fortunate, it falls upon suitable ground, and begins to grow, or to *germinate*, as we say. The living interior of the stone, which contains the seed of the young plant, begins to grow and passes through the shell, and so a new tree begins to form. It was for this that the flowers were made.

WHO LIGHTED THE VOLCANOES ?

A volcano, we know, is a great hollow mountain, and is named after Vulcan, the god who was supposed to deal with fire, because fire comes out of it. A volcano has a hole called a crater, and this hole seems to lead down into the hot inside of the earth ; so that, instead of this question, we might almost as well ask, Who lighted the inside of the earth ?

But the inside of the earth is always hot, yet volcanoes are by no means always in eruption, as we call it. It must be, then, that something happens which sets the volcano in activity, and the possible reason may be guessed ; and if we remember that most of the great

volcanoes, like Vesuvius, and Etna, and Hecla, are not far from the sea, it may be that the volcano communicates with the inside of the earth where it lies under the sea.

Now, if there happened an earthquake under the sea, and the crust of the earth cracked there, great quantities of water would pass through into the hot interior of the earth, where they would be instantly turned into steam, or rather into water-vapor or gas. This gas is formed under great pressure, like the gas which is formed when we fire a gun. It must get out somewhere, and so it finds its way to the crater of the volcano and drives before it everything that is in its way.

WHY DOES THE AIR NEVER GET USED UP?

We may say that, in a sense, a great deal of the air has already been used up, for we know that by far the greater part of all the surface of the earth, including all the water of the seas, is already burnt, and so has used up a great deal of the oxygen of the air. That happened a long time ago, however, before there were any living creatures on the earth. The air is constantly being used now—or rather the oxygen of it is being used—in the breathing of all living creatures; while the nitrogen of the air is being used by certain microbes, and now also by men themselves, who use electricity for this purpose; and, thirdly, green plants use the carbon dioxide of the air, upon which they feed.

Yet the air does not get used up as regards any of these gases. There must be a compensation of some kind going on, and there is. There is a compensation, as regards the oxygen, because green plants everywhere in the sunlight are giving off to the air a great deal of oxygen—perhaps enough to make up for what they take in by breathing, and probably enough to make up for what animals and men take in by breathing. As for the nitrogen that is used, we can easily show that that is compensated for, for when the animals and plants die their bodies are decomposed, and most of the nitrogen they contain, which they originally got from the air, is given back to the air. Lastly, the carbon dioxide taken from the air by plants is compensated for by the carbon dioxide which all living creatures give out to the air when they breathe.

WHEN A SEED IS PLANTED, IS THE WHOLE PLANT CONTAINED IN IT?

For many years before our own times this question was hotly discussed. There were two opinions. One group of thinkers declared that, if only we could see close enough, we should find a perfect tiny plant contained in the seed, and, for instance, a perfect tiny chicken in the egg. The other party of thinkers declared that this was not so; that nothing in the least like a plant or a chicken was contained in the seed or the egg. Then the microscope came and answered this question once for all.

In an egg there is nothing we can see in the least like a chicken, but a small plant can be seen with the naked eye in a bean or pea. Every living creature starts from a single cell, and these cells, seen under the microscope, are so like each other that we can hardly tell most of them apart. They must be really very different, but none of them has, at first, any structure which in the least suggests what kind of creature it will become.

It could not be that the whole stuff of the plant is contained in the seed. An oak weighs thousands of times as much as the acorn from which it sprang. By no possibility could the seed of any creature contain all the stuff that is in the creature when it is developed. All this stuff, except a tiny part, has been obtained by the growing creature for its food. That, of course, is why children, who have to grow, need far more food, in proportion to their size, than a full-grown person.

WHY IS IT THAT SOME TREES FLOWER AND OTHERS DO NOT?

The flowers of different trees differ widely in their size and their prominence, so that, while we all know the flower of the horse-chestnut, we may never have noticed that the oak has a flower. Yet, if we could trace back the history of every acorn, we should soon find that the oak has a flower. The size and appearance of what we call a flower usually depend almost wholly upon a particular part of the flower, which we call the petals.

Thus all that we notice of a rose is petals. But these are not necessary parts of a flower at all; and there are many flowers which have no petals, and are therefore not at all noticeable, especially when they are the flowers of large trees, and hidden among large leaves.

All trees without exception have flowers ; they may be large or small, but they always exist, and new trees could not be formed at all without them, for the flowers bear the seed in which the new tree begins its own life.

The whole world of plants may be divided into two great groups—those which bear flowers and reproduce themselves by them, and those which have no flowers, and reproduce themselves in other ways. The flowering plants are much the highest in the scale, and they are certainly the latest to have evolved upon the earth. The finest and most wonderful of all the flowering plants are the trees. But a fern, for instance, belongs to a much older type than any tree, and bears no flowers.

DOES THE ORDINARY LAWN GRASS HAVE A FLOWER ?

It is very likely that we have never noticed the tiny flower of lawn grass, yet certainly it has a flower, and grass could not continue without it. All the great company of grasses are included in the upper group of plants which we call flowering plants. The grasses constitute one of the "natural orders," as they are called, into which plants are divided ; and they are of more importance than any other. For these include not merely the lawn grass and ornamental grasses in general, but also what we call the cereals, such as wheat, oats, barley, maize, and others. These furnish the great basis of the food supply of mankind ; and if the grasses were to disappear from the earth, or if they were to lose their flowers, so that in a year they all died out, by far the greater number of all the human beings, and of many of the lower animals which the earth can now nourish, would die of starvation.

WHY IS BREAD CALLED THE STAFF OF LIFE ?

Bread has long been called "the staff of life" because it was thought to be the most valuable of all foods for human beings. We have now proved that this opinion is perfectly true, and that bread is really entitled to this name. Of course, bread can be made of various cereals—all of which are kinds of grass—but the bread to which the name refers is wheaten bread. This particular grass—wheat—yields the best if not the cheapest of all foods. It is *the* food of the Western world ; and if the supply

of it should fail we should have to live on rice, which is *the* food of the Eastern world, and which we know to be very much inferior to wheat in its power of sustaining human life.

The supply of this "staff of life" is now falling decidedly short of the need for it, and this is one of the great world-problems of the future. The time will probably come when, for sheer hunger, we shall have to stop growing other cereals out of which to make alcohol, and to grow wheat instead. At the present time so many people could not live in Europe, and notably in England, without wheat from America ; but the quantity of this that America can spare is not increasing, and may stop altogether in less than twenty years. It is possible to grow wheat on vast areas of Europe and Asia where it is not done ; and it is also possible to make a wheatfield produce far more wheat, and therefore more bread, than it does now.

IF ALL THINGS BORN WERE TO LIVE, COULD OUR WORLD SUSTAIN THEM ?

The answer is certainly "No." The average number of fishes in the sea is generally the same, yet one female fish may produce a million eggs—of which only one or two will live. A single microbe, if there were food enough, would multiply into millions in a few hours. Rabbits introduced into a country like Australia, where there are few enemies and much food, become a pest in a few years. Every kind of plant and animal, high or low, tends to multiply rapidly. And when we look closely at the facts we find that the reason why practically everything that is born does not live is simply that the earth cannot sustain them all. The struggle for life that goes on without ceasing among all creatures is a struggle for the food supply ; and there is always a much smaller food supply than is needed for the quantity of young life that is always competing for it.

We may wonder that Nature should bring so many more mouths into the world than she is able to feed. I think we are beginning to see that there are good reasons for this terrible waste, as it seems to be ; but, at any rate, among human beings a much larger proportion of young creatures find room and food on the earth than among any other kind of living beings.

WHY ARE NOT THE STARS ROUND LIKE THE SUN AND MOON?

The reason why the stars do not look round is simply that they are so far away. The planets are far smaller than the stars, but they are so near that when we look at them through a telescope we can easily see that they are round. They have a *disc*, as we call it. But however powerful the telescope through which we look at the brightest or nearest stars, we never see even the smallest disc, but only a *point* of light. Though the star that shines as a point through the largest telescope may be a million times larger than a little planet like Venus or Mars, which shows a disc through even a small glass, it is so far away that its disc cannot be seen, and it seems probable that no improvement in the telescope, and no increase of its size, will ever enable us to see the disc of a star. But we have no doubt that the stars *are* really round like the sun.

WHAT ARE SATURN'S RINGS MADE OF?

This question has deeply interested astronomers ever since the telescope was invented and Saturn's rings were first seen through it. The various rings, some dark and some light, look, through the telescope, as if they were made of something quite solid and without breaks, like a wedding-ring.

A great Scottish student of Nature proved that these rings could not possibly consist of solid matter without breaks, for such rings could not be formed, and would be bound to break up if they were formed. But rings that would endure as Saturn's rings do might be made up of a great number of small parts—like pebbles, for instance; and that is, at present, the best answer we can give to this question. We really do not know very much about the rings, and, indeed, the only thing we can be really certain of is that they are not continuous.

Nor do we know why they should appear dark and light. Lately it was thought that some changes could be noticed in the rings, but that is not certain. We know that the stuff of which the rings are made must be revolving round Saturn at a great speed, for otherwise they would be drawn into the planet by its gravitation, just

as the moon would be drawn into the earth if it stopped moving, or the earth into the sun.

IS THERE ANY LIFE ON SATURN?

Saturn is so far away that, in spite of its size, we cannot learn very much about it; and this question can hardly be answered. Probably Saturn is still so hot that there is no life upon it yet. The planet is very big, and big things take longer to get cool than little things.

We can say, however, that, if we could live on Saturn, we should find our sky very wonderful. It is true that the sun would look much smaller than he does to us, and would be not nearly so bright, for Saturn is further from the sun than we are; also we should miss the earth's moon from our sky if we lived on Saturn. But there would be much to make up for these losses. In place of the one moon that the earth has, we should find no less than nine in our sky, for that is the number of known moons that Saturn has, and there may be more. But even these nine moons would not be the most interesting and beautiful things in the sky as seen from Saturn, for the rings would surpass them far in beauty; and, indeed, we cannot begin to imagine what the sky would look like if the earth had rings like Saturn, or even only one of them.

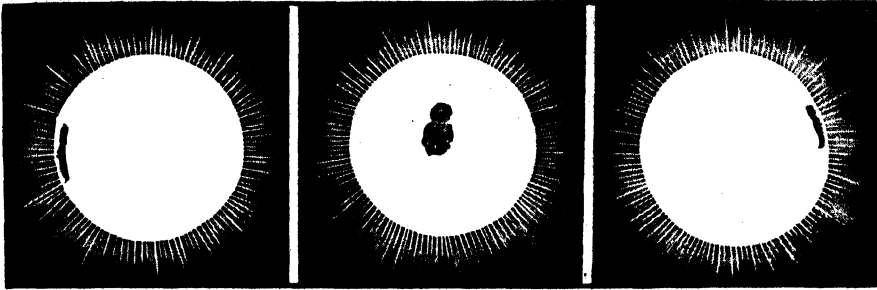
WHY IS A SUBMERGED SUBMARINE ALWAYS KEPT IN MOTION?

A submarine is so delicately balanced that if her tanks were filled so full of water that their weight would keep her quite under the surface, a very slight accident would sink her. Therefore as a matter of precaution, enough air is left in the tanks to keep her awash, that is so that the waves wash over her deck. When she is in this state of buoyancy, as it is called, she can be brought down many feet below the surface of the water and held at that level by the action of her rudders on the water while she is in motion. If her engines were to stop she would immediately rise.

If the commander of a submarine does not wish her to travel through the water, he must either anchor at the surface or bring her down to rest at the bottom of shallow water.

THE NEXT QUESTIONS ARE ON PAGE 2243.

The Story of THE EARTH.



These three pictures show us how we know that the sun spins round. The small spot on the sun is seen one day as in the first picture; after six days more it is seen as in the second picture (where it is enlarged for clearness); and in six days more it is seen on the other side as in the third picture. As the spot does not move, we know that it must be the sun that moves.

THE WONDER OF THE SUN

WE must, of course, begin our study of the heavenly bodies with the sun. He is by far the most important of them all for us, as the source of the earth's life and beauty, and changes that occur in the sun affect the conditions of the air we breathe. In studying the sun we are studying the only one of the stars which we can know at all closely, and we are thus helped to guess something of the nature of the other stars.

We are to think of the sun, then, as a great glowing ball which ceaselessly sends forth, day and night, in every direction, enormous streams of light and heat, and has been doing this for countless ages. We know how powerful the sun's heat and light are in so far as the earth catches them; but it is right to remember that all the light and heat that fall upon the earth from the sun are a mere nothing compared with the total amount which the sun is always giving out.

As we know the size of the earth and its distance from the sun, we can calculate that the amount of the sun's light and heat which fall upon the earth is less than one two thousand millionth part of the whole. Yet this trivial fraction of the sun's whole light and heat makes all the difference between an earth on which no life could be and the earth we know, filled with life and beauty on every side. As has been well said: "For the power to live and move, for the

CONTINUED FROM 1969



plenty with which we are surrounded, for the beauty with which Nature is adorned, we are immediately indebted to one body in the countless hosts of space, and that body is the sun." We can get some idea of

the sun's power by remembering that if there were 2,000,000,000 earths dependent for all these benefits upon the sun, he would be able to satisfy them all. The sun could give to every man, woman, and child in the world the same heat as he gives to the whole earth, and yet have left enough for hundreds of millions more.

We know that the earth, compared with our own small bodies, is large. The distance of a line drawn right through it from one side to the other and passing through its centre is about 8,000 miles. This line is called the diameter, which really means the *measure across*. Now, the diameter of the sun is about 865,000 miles. The sun is very nearly round, like a round ball, and in order to find the distance right round a ball, when we know its diameter, we have to multiply the diameter by about three and one-seventh. If you do this, you will find for yourself what is the circumference of the sun, or the distance right round it. The 25,000 miles of the earth's circumference is hardly any distance at all compared with the circumference of the sun, and it has been calculated that a train traveling sixty miles an hour would have to travel

without stopping for five years before it went right round the sun. We shall see in a little while that the sun spins round on itself as the earth does, and though it takes much longer to spin right round once than the earth does, yet its size is so enormous that the real movement of any part of its surface must be very quick.

THE SUN IS BIGGER THAN A MILLION EARTHS LIKE OURS

We can get some further idea of the size of the sun when we learn that if it were cut up into a million parts of equal size, each of these would be bigger than the earth. They would not, however, be as heavy as the earth, for the sun, as we shall see, is much less dense than the earth. The mass of the sun, as compared with the mass of the earth, is not a million times as great, but about three hundred thousand times as great. The earth, then, we see plainly, has shrunk much more than the sun has, and the matter in it is more tightly packed. The earth is denser because a great part of the matter of the earth has condensed into liquids and solids, but the hot sun consists of a mass of gas, and though that gas must be very tightly packed in the inside of the sun, yet an average piece of the sun, so to speak, would contain much less matter in it than an average piece of the earth.

On a bright, clear day we say that the sun is hot. It may burn our faces and hands painfully, and there are parts of the world on which the sun shines so directly through the air that no one can stand his midday strength.

THE REAL HEAT OF THE SUN WOULD CAUSE THE EARTH TO SHRIVEL UP

But all this gives us a poor idea of the real heat of the sun. We know that the degree of heat of anything can be measured by means of a thermometer. Using an ordinary thermometer, we say that the heat of the body is between 98 and 99 degrees, which we mark like this: 98° and 99°. If the heat of the air in the shade is as high as that, we can scarcely stand, so hot is it. Boiling water is hotter still, and the flame of a match or a fire is much hotter than boiling water. For some purposes—as, for instance, in order to melt certain metals—we have to produce on the earth as high temperatures as we possibly can ;

and by means of electricity, in what is called the electric furnace, we can, with great difficulty and at great cost, produce for a short time a temperature of nearly 10,000°.

All this is very much less than the temperature of the sun. It is by no means easy to find out what that really is, and many calculations have been made. But if we think of the temperature of the surface of the sun as anywhere between 10,000° and 15,000° we shall be within the limits of the truth. The interior must be far hotter. If the earth were raised to that temperature—say, by putting the earth in the atmosphere of the sun—not only would every living creature be burnt up long before the earth had reached any such temperature, but in a very short time the whole earth, including not merely the sea, but the hardest rocks, would be turned into a hot gas which would glow and give out heat and light just as the sun does, though, of course, since the earth is so small, its heat and light would not last very long.

AN IMMENSE FIRE BLAZING FOR EVER 93,000,000 MILES FROM THE EARTH

So great is the temperature of the sun that if the temperature of the earth were gradually raised to it there would come a time when all the compounds would be split up. Chemical compounds cannot exist at such a high temperature as that of the sun. All the water of the earth, after having been made into a gas by the heat, would be broken up into the oxygen and hydrogen of which it is made. Sand and the rocks that are made of burnt or oxidised silicon would be split up into their oxygen and silicon. These elements and all the others, including all the metals, would exist in the form of intensely hot and intensely bright gases. Such a picture gives us some idea of what the composition of the sun is.

The distance of the sun from the earth changes slightly from day to day, as the earth does not move round the sun in a circle, but is a trifle nearer to him in winter than in summer. The difference is very slight, however, and 93,000,000 miles is about the average distance.

Compared with the size of the earth, this distance is a very great one, but, compared with the distance of the other stars, it is a very tiny one. As Sir

Robert Ball says : " The fact is that we are nestled up comparatively close to the sun for the benefit of his warmth and light, while we are separated even from the nearest of stars by a mighty abyss."

HOW THE END OF THE EARTH WOULD BE LIKE THE GOING OUT OF A STAR

If the sun were to move away from us until at last he were as far away as even the nearest of the stars, the earth would exist in perpetual night, and no creature could live upon it. If it were possible for a man to live upon such an earth, and if the sun at that distance could be seen at all, it would be for him only one of the stars, and by no means one of the brightest. " If the sun and the earth and all which it contains were to vanish, the effect in the universe would simply be that a tiny star had ceased its twinkling."

Perhaps you notice the word tiny and say : " How can the sun be called tiny when we know how big it is ? " But all words like great and small, huge and tiny, are *relative* terms. They only mean that a thing is huge or tiny compared with something else. Compared with an atom, the smallest of living cells is huge ; compared with a cell, our bodies are huge ; compared with our bodies, the earth is huge ; compared with the earth, the sun is huge ; compared with the size of the visible universe, the sun is tiny ; and the whole size of the visible universe, across which it would take light thousands of years to travel, is nothing at all compared with the size of the infinite universe beyond, which we cannot see.

WHAT GALILEO SAW WHEN HE TURNED THE FIRST TELESCOPE TO THE SUN

In the year 1611, Galileo, with the aid of his telescope, discovered that there were dark spots upon the sun, and that these spots moved across the surface of the sun from day to day. This was a very interesting and important discovery, though it had terrible consequences for Galileo. There was nothing to be found about sun-spots in the writings of the great Greek thinker Aristotle, and so the people who were powerful in the time of Galileo said that what he called sun-spots were due to faults in his telescope or in his eyes. Worse than this, the discovery of sun-spots was regarded as an insult to the sun, as implying that he

was not perfect, and therefore as a wicked thing to assert the existence of. But since the time of Galileo we have learnt to regard sun-spots as among the most interesting things in the sun. When large ones are present, anyone can see them for himself by looking at the sun through a smoked glass. If we watch them from day to day, we find, as Galileo himself found, over three hundred years ago, that they very often travel right across the face of the sun, from side to side, then disappear, and then appear again on the other side.

We notice also that as they reach the side of the sun they seem to get narrower, as if we were looking at them sideways. This can only mean that the sun spins round upon himself, and we now know that he takes rather more than twenty-five of our days to do this—that is to say, that while the sun spins round once, the earth spins round more than twenty-five times. We are not quite certain, but it may be as many as twenty-seven times. The earth's spinning makes day and night for us, but of course it makes no difference to the brightness of any part of the sun, which is the source of our day.

HOW THE SPOTS ON THE SUN SHOW US THAT THE SUN SPINS ROUND

The study of the sun-spots as they travel across, and as they change their apparent shape, helps us to prove how the sun spins. We find a spot traveling across the sun in about twelve or thirteen days, and then we may find the same spot appear again on the other side of the sun after about twelve or thirteen days more. We find that sun-spots always travel in the same direction, which is, of course, the direction in which the sun spins. We find also that the sun spins round in the same direction as the earth does, and in the same direction as the earth and all the other planets revolve round the sun. The same is true of the direction in which the moon travels round the earth, and the direction in which the moon spins upon itself. This great fact about the movement of the sun, the planets and their moons lead us, like many other facts, to believe that all these bodies really have the same history, and were formed from one parent, as we read on a former page.

Sun-spots are noticed at various parts upon the surface of the sun, and there are other parts where they are not noticed. We do not often see them close to the Equator or middle line of the sun, and we never find sun-spots near the Poles of the sun. There are certain zones or belts which correspond pretty well to what we call the temperate zones of our own earth, where alone the sun-spots are found.

Of course this fact means something as to the way in which the different parts of the sun are made, but we have not yet been able to understand it. Occasionally we find a sun-spot close to the Equator, and occasionally one not so very far from one or other of the Poles. When we compare the rate at which these various spots move, we find that those nearest the Equator travel completely round the sun in less time than those nearer the Poles. If these were spots upon a solid body which rotated all in one piece, as a top does, they would all take the same time to move round.

THE MYSTERY OF SUN-SPOTS THAT WOULD COVER UP THE WHOLE EARTH

The fact that the sun-spots move at different rates can only mean that different parts of the sun's surface go round at rather different speeds, as is quite possible in the case of a body that is not solid, but is made of gas. Lately, in careful study of the giant planet Jupiter, it has become almost certain that various parts of his surface move round as he spins more or less independently of one another, and this doubtless means, as it does in the case of the sun, that the surface of Jupiter is not solid, but either gaseous or perhaps partly gaseous and partly liquid.

What we usually call sun-spots are darker than the rest of the sun. There are many spots also, perhaps more than the dark spots, which are brighter than the rest of the sun. We do not yet know what these spots really mean, though we can study the light which comes from them, and hope soon to learn something by splitting it up and finding what it is composed of. We must think of the surface of the sun as consisting of hot gases reaching to a tremendous depth. These gases are in a state of great commotion, as we learn when we study the

sun in other ways, and the various spots, dark and bright, which we see upon the sun may depend upon the collection of particular kinds of gases at particular places. They may be due, as has been asserted, to uprushes of gas coming from the deeper parts of the sun, but we cannot really explain them yet. We call them spots, but we require a better idea of their size than that word gives us. It is not uncommon to notice a spot upon the sun into which a couple of earths could easily be bundled.

THE WAY IN WHICH CHANGES ON THE SUN'S FACE MOVE A NEEDLE ON THE EARTH

Another thing which has not yet been explained, but which it is very interesting to know, is that there is some connection between sun-spots and various things which go on upon the earth, especially changes in the earth that have to do with its magnetic power. Changes in the earth's magnetism and in the movements of magnetic needles on the earth correspond with changes in the number and size of the dark sun-spots. When we come to think of it, this is an amazing thing—that these changes, whatever they are, in the surface of the sun should be registered by magnet needles on the earth. Probably it is not right to say that sun-spots cause the disturbances in the way in which the earth, that great magnet, attracts the compass needle. It is more probable that something happens in the sun which at one and the same time causes the spots there, and also so affects the quality of the various influences which the sun pours upon the earth as to cause these changes in its magnetism.

THE SUN'S ELEVEN-YEARS PUZZLE THAT SETS THE SCIENTISTS THINKING

There is something even more remarkable about sun-spots, which is that the number and size of them change from year to year in a regular way. There can be no doubt about this, for sun-spots have been carefully watched for three hundred years, and we find that through all this time there has gone on a regular increase and decrease in the number and size of sun-spots, which at the end of eleven years are just about as many and as large as they were at the beginning, and then repeat their changes for another eleven years, and so on. When a change

THE SUN'S MIGHTY CROWN OF LIGHT



This picture gives us some idea of the shape and splendor of the great ring of light round the sun, though no picture can give any real idea of its magnificent beauty. The pity is that only for a few seconds, once in many years, when the moon hides the body of the sun from our view, have we any chance of seeing this mighty crown of light; but of course it is always there. The part of it that is nearest to the sun is intensely bright, but it gives out a paler light than the red prominences which can still be seen blazing through it at various points.

in anything goes round and round like this in a regular way, we call one round a cycle (that is, a circle—bicycle means two circles). So we say that the sun-spots show an eleven-year cycle. Whatever causes them is something which waxes and wanes at this rate. What it is and why it should do this, we do not at all know, but it is one of the facts which will some day help us to understand something about what goes on in the inside of the sun.

HOW SIR NORMAN LOCKYER SHOWED MEN A NEW LIGHT ON THE SUN

It so happens, fortunately for us, that the size and distance of the moon, compared with the size and distance of the sun, are just such that, now and again, the moon, passing between us and the sun, almost exactly fits for a few seconds or minutes over the body of the sun, as it were, so that anything projecting from the body of the sun on any side can be seen. Such things exist. They are very beautiful in themselves, and they tell us a great deal about the surface of the sun. They are not bright enough, however, compared with the blaze of sunlight, to be seen as a rule, any more than the stars can be seen in the daytime. Only during a total eclipse of the sun, when the body of the sun is hidden by the moon, can we clearly see these things which project from it.

Some years ago, however, the great English astronomer Sir Norman Lockyer made an instrument by which astronomers can see these prominences of the sun, even when there is no eclipse. The prominences are great masses of hot gas. They give out light of a different kind from that given out by the body of the sun, and Sir Norman Lockyer's instrument enables the astronomer to cut off the ordinary sunlight from his eye—as the moon does during a total eclipse, but in a very different way—and so to see the prominences by themselves. They are notable for their enormous size and their splendid red color.

THE GIGANTIC FLAMES OF FIRE THAT WOULD CONSUME THE WORLD

We do best to think of these prominences as gigantic flames, and we find that, like other flames, they flicker, though of course they are so enormous and so far away from us that they require

to be watched for many minutes or some hours before we notice their movements. A total eclipse lasts only a very few minutes at the most, and it would never have been possible to learn what we know about the prominences if astronomers were not able, as we have seen, to watch them now for hours at a time. We can sometimes see one of these great red flames starting forth from the surface of the sun, and dashing outwards. We thus come to see that the surface of the sun is far from being a steady, quiet thing, but is endlessly disturbed by mighty tempests. No storm that travelers ever experienced on the earth can compare for a moment with the storms upon the sun, which are made by gases more intensely hot than the hottest earthly furnace. We can measure the length that these flames often attain to. Many have been measured ten or more times as long as the diameter of the earth, and one has been watched which, in the course of an hour or two, dashed out from the sun to the distance of more than one-third of a million of miles. Then, in only a few minutes more, this mightiest of flames broke up and shortly disappeared.

THE SUN'S BEAUTIFUL CROWN, WHICH MEN HAVE SEEN FOR ONLY A FEW SECONDS

Some idea of its force as well as its size is given us when we learn that this flame must have dashed out from the sun at the rate of fifty miles a second—a speed “more than a hundred times greater than that of the swiftest bullet ever fired from a rifle.”

Our English word crown, meaning something that surrounds the head, is derived from the Latin word *corona*. The sun, as we can see, during a total eclipse, has a mighty crown or corona. The picture on page 2091 gives some idea of the shape and splendor of this ring of light round the sun, though no picture can give any idea of its magnificent beauty. We should always carry in our minds a picture of what the sun looks like during a total eclipse, and then, when we look at the sun any day, we should try to remember how vastly more wonderful he would look if it were not that our eyes are mastered by the light which comes from his body, so that the wonderful things glowing all around it cannot be seen by us.

FLAMES THAT WOULD SHRIVEL UP THE EARTH



The surface of the sun, like that of the earth, is not smooth; the flames fly out in all directions, fiercer than any heat known on the earth, and long enough to shrivel up the earth like a speck as in this picture, which shows how the earth would look in the midst of the sun's flames. The picture is drawn as if the sun were eclipsed by the moon, and we were looking from another world. The surface of the sun is endlessly disturbed by mighty tempests of fire, and many of its flames have been measured ten times as long as the distance across the earth.

The great things which the sun produces are heat and light. These are waves in the ether — not material things like atoms or pieces of atoms. But lately we have been studying upon the earth the things that are given out by flames, by hot gases, and even by hot, solid metals. These things, like the sun, give out light and heat, but they also give out tiny pieces of electrical matter which go to make up atoms and which we now call electrons.

THE LITTLE BITS OF ELECTRICITY THAT ARE ALWAYS FLYING OUT OF THE SUN

The hot matter that makes up the sun is in ceaseless violent movement giving out electrons. On all sides without end, the sun is pouring out not only heat and light, but also these tiny particles which rush through space, and probably account for some of the things which happen in the solar system. It may possibly be, for instance, that the reason why a comet develops a tail as it approaches the sun, and leaves the sun with its tail in front of it instead of behind it, is that these electrons from the sun strike the comet, and drive the lighter part of it in a stream on the side away from the sun.

We already know that there are no compounds in the sun, and why that is so. When we study the light of the sun we are able to find out what elements it mainly contains, or, at any rate, what elements are contained in its outer parts. The corona of the sun seems to consist mainly of hydrogen, and Sir Norman Lockyer thinks that there is also another element there which does not occur upon the earth, as the earth is at present, and to which he has given the appropriate name of *coronium*. Nearer the body of the sun we find proof of the existence of the gases or vapors of many elements which we know well, and which can be found in our own bodies — hydrogen, calcium (or lime), magnesium (which gives such a bright light when it is burnt), sodium, and iron; and besides iron a large number of other metals well known on the earth.

THE SUN IS PERHAPS A STAR IN THE MIDDLE OF ITS CAREER

It is very important to compare the sun in these respects with other stars. We now know that all stars, including the sun, have a history; that they

cannot remain bright for ever, but must gradually cool. As they cool, the chemical composition of their outer parts changes, and so the quality of their light changes. We believe, then, that the sun is somewhere in the middle stage of a star's history. At its hottest and most brilliant stage a star gives out a very white light. Such a star is Sirius, the brightest star in the heavens so far as eyes looking from the earth are concerned. Later on we suppose that changes occur in the elements of a white-hot star; it gets somewhat cooler, and becomes yellow-hot like the sun; and we can see other stars in the heavens which we may call red-hot, the chemical composition of which, as judged by their light, is correspondingly different from that of the sun at present.

THE MARVEL OF THE SUN'S GREAT POWER IN ALL OUR DAILY LIVES

We know enough to allow us to say that the sun and the planets and their moons are really separated parts of one great whole. We know that all these parts are slowly losing heat and shrinking. We can learn from the study of the stars and the nebulae in many parts of the heavens something of what the history of the sun must have been. From other stars, the redder ones, from the little we know of the dark stars that cannot be seen, and from the study of our own earth — which, after all, was once a little sun, but has cooled down very quickly — we can guess a good deal as to the future of our sun.

Meanwhile, we know that he is what he has been since life first appeared on earth, and what he must continue to be so long as life remains on earth — the great source of the power which, mainly in the form of light and heat, and also in other ways which we are only beginning to understand, sustains all life, makes the rain and the rivers, gives every visible part of the earth its light and color and beauty, supplies the food of the green plants upon which we feed, and so works in our muscles every time we move, in the eyes which see the beauty of the earth and of the sun itself, and in the brains by means of which we try to learn how all these things come to be.

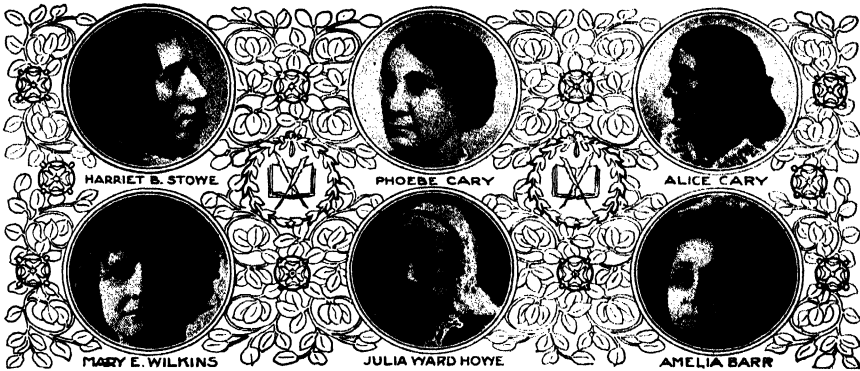
THE NEXT PART OF THIS IS ON PAGE 2205.



SHAKESPEARE

The Book of MEN & WOMEN

MILTON



HARRIET B. STOWE

PHOEBE CARY

ALICE CARY

MARY E. WILKINS

JULIA WARD HOWE

AMELIA BARR

WOMEN WRITERS OF THE UNITED STATES

IN the early days of our country American women did not write for publication. Few were well educated, for only the boys were sent to college. The girls usually married when they were young and family cares demanded their time and thought, as most of our modern appliances for making housekeeping easy had not been invented. There were no steam or hot-water heaters—no gas, no electricity; the open fires needed constant tending, and the tallow candles were made by the tedious process of dipping. The women accomplished a wonderful amount of spinning and weaving, baking and brewing. They sewed much, with exquisite small stitches which the women of to-day fail to equal, and knitted all the stockings that their families wore.

These pioneer women had active minds. Busy as they were, they loved to read. As the wild new country became settled and civilized, they found more leisure for books. Occasionally, and more and more frequently, some woman felt prompted to write a poem or a story. But about a quarter of the nineteenth century had slipped away before women's literary work amounted to much.

Mrs. Emma Southworth was among

CONTINUED FROM 2018

the earliest of our women writers, and one of the most popular for many years. Her books are still read, although not by the class of readers who enjoyed them at first. Taste changes, and to educated people now, Mrs. Southworth's stories seem over-sensational and florid. They are interesting to the kind of people who like excitement, but who do not like to think.

A POPULAR AUTHOR NOW FORGOTTEN

Dorothy Eliza Nevitte, who became Mrs. Southworth, was born in Washington, D. C., December 24, 1819. She was a gifted and charming girl who was married when very young, and very unhappily. She was still very young when she found herself in poverty with a little boy and girl to support. At first she taught in a public school and found it tiresome work. She was noted among her friends for telling entertaining stories and now she turned this talent to account. She wrote out her stories and sent them to the leading papers of the day, the Baltimore Visitor, the Philadelphia Saturday Evening Post, the New York Ledger. To her great joy they were so well liked that she was soon able to give up teaching. Mr. Robert Bon-

JULIUS CAESAR

HERBERT SPENCER

ner, the well-known editor of the New York Ledger, made a contract with her binding her to write only for his paper, of which she was the most popular contributor for over thirty years. The men and women of her day eagerly awaited each new tale from her pen and fairly clamored for more. She wrote sixty-eight novels. Their titles, *The Deserted Wife*, *The Lost Heiress*, *The Curse of Clifton*, etc., suggest the romance and mystery in which Mrs. Southworth and her readers revelled.

The spirit of all her work is pure and high-minded. In criticizing, it is only fair to remember that she wrote as she did because she was a child of her own time, and knew its taste.

A WOMAN WHO IS NOW ALMOST FORGOTTEN

A woman who held a great place many years ago, but is almost forgotten now, is Margaret Fuller. She was born in Cambridgeport, Massachusetts, in 1810, and showed a great thirst for knowledge. She began Latin at the age of ten, and Greek when thirteen. After leaving school she taught for a time, then edited a literary paper, and made some translations from the German. She wrote a book of travels and some essays, which few now read. She was a brilliant talker and a wonderful letter writer, and when she lived in New York was the centre of a large circle of admirers.

She went to Italy in 1846, and married an Italian nobleman, the Marquis Ossoli, the next year. During the Italian struggle for independence she worked in the hospitals and finally determined to return to the United States. The ship went down as it was approaching New York, July 16, 1850, and she with her husband and little son was drowned.

A FAMOUS NOVEL THAT MADE A GREAT STIR IN THE WORLD

Harriet Beecher, who was born in 1811, was one of a big family of gifted brothers and sisters, the children of the Rev. Lyman Beecher of Litchfield, Conn. There was not much money in the family but somehow these clever boys and girls acquired fine educations, and climbed up through some hardships and privations to fill, most of them, useful and conspicuous positions.

Harriet became Mrs. Stowe and a busy wife and mother. She wrote a number of successful novels, *Dred*, *Oldtown*

Folks, and others, but her lasting claim to remembrance rests upon *Uncle Tom's Cabin*, which helped to stir people to think of the great question of slavery. Hundreds of thousands of copies of the book were sold in the Northern states and the British Isles, it was translated into several foreign languages, and was made into a play which is still often acted.

In those days when household toil was so heavy and constant, American women appear to have been particularly fond of poetry. Perhaps they felt the need of its helpful uplift from everyday drudgery. Many of them published verse. Most of it is pretty, sentimental and meditative. It lacks force and vitality, and was soon forgotten.

TWO SISTERS WHOSE POEMS YOUR MOTHERS READ

Alice and Phœbe Cary are among the few who deserve to be remembered. Their beautiful hymns and other poems endeared them to English as well as American readers. These devoted sisters were born in an attractive country home—Mt. Healthy—near Cincinnati, Ohio, Alice, April 26, 1820, and Phœbe, September 4, 1824. Their father, a New Englander by birth, was one of the pioneer settlers of Cincinnati. They lost their mother when they were young girls, and the stepmother who came to govern the household was not always kind. She disapproved of their favorite evening occupation of writing verse and would not allow them candles for it. So the clever young authoresses secured the necessary light by burning rag wicks set in saucers of lard.

Happily they possessed some money of their own. So when Phœbe was twenty-eight and Alice thirty-two, they sought a home and fortune in New York City. They were quickly successful in selling their writing, both prose and verse, to the leading magazines.

They were lovely and attractive young women, clever talkers, hospitable, and they very soon formed a delightful circle of friends. Their pleasant home became a favorite gathering place for the most cultivated literary and artistic people of New York.

The beautiful hymn by which they are perhaps best remembered—*One Sweetly Solemn Thought*—was written by Alice when she was eighteen. Their lives moved happily and successfully until

THE HOMES OF TWO FAMOUS AUTHORS



Most of you have read Uncle Tom's Cabin, and perhaps have wept over little Eva and Uncle Tom. During the latter part of her life, Mrs. Stowe lived in this house in Hartford, and took a leading part in the social and literary life of that delightful city, where so many literary people had their homes. Mark Twain was a resident of Hartford, and Charles Dudley Warner also. Whittier once lived there for a short time.



This is a picture of the home of Louisa M. Alcott, whose books you all probably know and love. It was here that she wrote the famous series of books telling the adventures of Jo and Meg and Beth and all the March family, and it is of this house that she tells in her stories. It is still standing in Concord. Photographs copyright by Detroit Photographic Company.

Phoebe's death in 1871. Her sister was broken by this great sorrow and died shortly afterward. The hymn was set to sweet music by Robert Ambrose, a Canadian composer, and has given comfort to many troubled hearts.

A WOMAN WHO WROTE ONLY ONE SUCCESSFUL STORY

Another woman who, like Mrs. Stowe, is remembered chiefly for one story, is Maria Susanna Cummins. She belongs to the period of the Cary sisters, for she was born in Salem, Mass., April 9, 1827. Her father, Judge David C. Cummins, an able lawyer, believed in educating girls. He sent his bright young daughter to a private school and encouraged her desire to write. The great success of her life came when she published *The Lamplighter*, in 1854. It became immediately popular, and 40,000 copies were sold in two months. Everybody read it and talked about it. In England, too, it was immensely liked. The pleasant old story is still widely read. You may find it in nearly every public library.

Yet it is a simple story, simply told. Readers' hearts were touched at once by the forlorn little waif adrift in the streets of New York, rescued by Uncle True, the kind old lamplighter, and enabled to grow up a good and lovely woman, who deserved all the good fortune that finally comes to her. The story is told with warm-hearted sympathy which is the secret of its undying popularity. Miss Cummins was never able to repeat this one great success.

STORIES OF A CIVILIZATION WHICH IS GONE FOREVER

Many of our early women writers were Southerners. Some of these began to write when very young. Augusta Evans was only seventeen when she wrote *Inez*, her first novel. She was born in Columbus, Georgia, in 1835. The life of the brilliant Southern woman is a record of success. She wrote many novels and her publishers were willing to pay well for what readers so eagerly demanded. For *Vashti* she received \$15,000. Several generations of readers delighted in *St. Elmo*, *Beulah*, *At the Mercy of Tiberius* and *Infelice*, and many readers delight in them still. Augusta Evans married Mr. Wilson, a wealthy railroad manager of Mobile. There he made her a beautiful home where she could indulge her love for cultivating flowers.

Southern people love Mrs. Wilson not alone for her popular stories. They never forget that during the Civil War she fitted up a house in Mobile as a private hospital and here tenderly cared for sick and wounded Confederate soldiers.

Another Southern woman worth remembering because her books have given pleasure to so many is Marion Harland, whose real name is Mrs. Mary Virginia Hawes Terhune.

A WOMAN WHO WROTE NOVELS AND COOKBOOKS

Mary Virginia, born in Amelia County, Virginia, about 1836, was educated with her brothers and sisters by tutors and governesses. She began to write when a child but for years kept her manuscripts hidden. She was eighteen when she published her first novel, *Alone*. It was followed by many others, pleasant entertaining stories which served their purpose and must some day be forgotten. Miss Hawes was about 20 when she married a gifted young clergyman, the Rev. E. P. Terhune, a very happy marriage until his death over fifty years later.

He was astonished to find his literary young wife such an able housekeeper. She herself said that her excellent receipt book, invaluable to many housekeepers—*Common Sense in the Household*—would do more good than all her other books.

She has three children who have published books. Her son, Albert Payson Terhune, is an editor, who has also written several books; and two daughters, both married, with homes of their own, have found time to write books. All of them have written one or more books jointly with their mother.

ANOTHER OLD BOOK WHICH HAD MANY READERS

Girls in this day of many new stories can scarcely understand the thrill of delight with which *The Wide, Wide World* was welcomed by the public in 1851. It is said to have been the most popular novel ever written by an American with the single exception of *Uncle Tom's Cabin*. The publisher felt doubtful about it, but his mother, who read it in manuscript, persuaded him to accept it. Her judgment proved good. A quarter of a million copies were sold. Everybody read it, young and old. The great French critic Taine could not understand how a three volume novel could be de-

voted to the moral progress of a girl of thirteen.

The author, Susan Warner, was born in New York, July 11, 1819. Her father, a New York lawyer and also a writer, owned Constitution Island in the Hudson River near West Point. Here she spent much of her life. She wrote many popular stories, of which *Queechy* and *The Wide, Wide World* have proved the most enduring.

THE MOST POPULAR WRITER FOR CHILDREN

A bright and shining name among our women authors is that of Louisa May Alcott. Every year her pleasant stories, *Little Women*, *Little Men*, *Old Fashioned Girl*, *Eight Cousins*, and the others, appear in gay new holiday dress to delight new generations of young people. She is perhaps the most beloved of all our writers. Louisa was born in Germantown, Pa., November 29, 1832, her father's 33rd birthday, the second child of an unusually gifted father and mother. The four sisters, whom the world knows so well as the Meg, Joe, Beth and Amy, of *Little Women*, did not have an easy childhood, for they were desperately poor. Their father, Bronson Alcott, was a Connecticut Yankee, but he had very little Yankee shrewdness. He was a philosopher who longed unselfishly to teach the world beautiful theories of life. He did not find this a profitable business, and proved himself singularly unable to earn enough money to make his family comfortable. The burden of doing so rested mainly on his wife, one of the fine old Boston family of Mays, a woman of rare courage and energy. Very often the family had not enough to eat, and the girls, although they longed for pretty things, had to wear plain and shabby clothes. But as they all loved each other dearly and usually laughed instead of crying over their troubles, they managed to have a great deal of fun.

LIFE IN CONCORD WHEN MISS ALCOTT WAS A GIRL

Much of the time they lived in the old town of Concord, Massachusetts, in Orchard House, later the home of the Hawthornes, and here they were fortunate in their friends, the young Emersons, Hawthornes, Channings and others bearing names which are well known in American literature. Louisa must have been a delightful playmate. She

loved to get up plays from their favorite stories, which she and the others acted in the barn, and sometimes Ralph Waldo Emerson, Nathaniel Hawthorne, Bronson Alcott and the other parents came to see them.

Louisa always loved to sew. She tells us that at ten she set up as a doll's dress-maker with her sign out and wonderful models in her window. She inherited her mother's practical sense and energy, and from a very early age she determined to make life easier for this dear mother. She began when very young to bear her share and more of the family burdens. She cooked and scrubbed and sewed. She tried teaching, not very successfully. She acted as companion to an invalid lady. Whatever she did she found time to tell and scribble stories and verses. Everything funny, romantic or picturesque appealed to her lively imagination and was stored up in memory for future use.

She was paid \$5 for her first story, which was published when she was sixteen. After that came a long hard time of effort before success. Most of her early sensational little stories are forgotten. When she curbed her fancy and began to write of true experiences she began to succeed.

Hospital Sketches was her first real success. It told with sympathy, humor and pathos what she had encountered while nursing sick and wounded soldiers in the hospital at Georgetown in the District of Columbia. Stirred by pity and patriotism she had insisted upon undertaking this nursing, which cost her health, for she was never as well afterward. But in some ways the remainder of her life was comparatively easy. One success led to another. *Little Women* was prodigiously popular. It was translated into French, German and Dutch and it was very popular in England.

A STORY OF HOLLAND BY AN AMERICAN WOMAN

Probably most of you have read the delightful story, *Hans Brinker* or the *Silver Skates*. Translated into French, German, Russian and Italian, it has charmed the children of many countries. We know its author for other pleasant stories and for much pleasant verse for children. Mary Mapes, later Mrs. Dodge, was born in New York in 1838, and grew up among the best social, liter-

ary and artistic influences of her native city. She married Mr. Dodge, who soon died, and she then returned to her father's home with her two small sons.

Mrs. Dodge was a delightful mother, a real playmate. If she found her boys growing interested in a particular subject, she quietly studied it, to help them and to share the interest. She was gifted in many ways, an able musician, skilful in drawing and modeling, and with unusual business ability. She had been contributing to the magazines for some time, and had some editorial experience when the *St. Nicholas* was organized in 1873. She was invited to become its editor and filled the post acceptably for many years. She chose the name which was to become dear to thousands of boys and girls. She died in 1905.

THE FRIEND OF THE INDIANS

Helen Hunt Jackson deserves to be remembered both for her prose writings and her poetry. She wrote some delightful tales for children, such as *The Naughtiest Day of My Life*, and *Nellie's Silver Mine*. She must have been a delightful child herself, impulsive, warm-hearted and imaginative. Her father was a professor of languages and philosophy at Amherst College. She was born in the college town in 1831, and had fine educational opportunities. From her mother she inherited a happy and buoyant nature, which kept life always interesting to her even when it was hard. For it brought her much sorrow. She was happily married to Major Hunt, a young engineer officer, who was killed by the explosion of a torpedo with which he was experimenting. Her little sons both died and her health broke down.

At Colorado Springs, where she had gone in search of health, she met and married William Sharpless Jackson of that place. She soon became interested in the Indians and the wrongs they had received from our government. So strongly did she feel that she returned to New York to study Indian matters at the Astor Library. She then wrote *A Century of Dishonor*, of which she gave a copy to every member of Congress. Congress then appointed her a special commissioner to investigate Indian affairs and one result of this work was her novel *Ramona*, a story of the Mission Indians of California. She died in 1885.

THE AUTHOR OF LITTLE LORD FAUNTLEROY

We claim Frances Hodgson Burnett as an American author because she loves our country and lives here, but she was born and lived the first 15 years of her life in England. After her father's death in 1865, his wife brought her family across the Atlantic and settled in Tennessee.

Frances Hodgson was born with a genius for telling stories. She never had to learn the art. From the time she was a tiny school girl she delighted her playmates this way. The family were poor and she naturally sought to make her gift profitable. She had published a good many stories before fame began to come to her with *Surly Tim's Troubles*, published in 1872. From that day her success has been unvarying.

She has never excelled *That Lass o' Lowrie's*, a brilliant story of mining life. Most boys and girls have read her delightful and perhaps best known story, *Little Lord Fauntleroy*. It remains one of the most popular of children's books. Dramatized, the story had equal success on the stage. *Fauntleroy* curls, and *Fauntleroy* costumes became popular for little English and American boys. The delightful little boy still stands for what is most charming and picturesque in childhood. Another pleasant tale for children is *The Secret Garden*.

THE AUTHOR OF NEARLY SEVENTY BOOKS

A writer with a real gift for story-telling is Amelia E. Barr. She was born in England in 1831, but came to the United States soon after her marriage. Her husband and her three sons died of yellow fever and in 1869 she came to New York with her three daughters to make a living with her pen. Her brave fight was successful, and thousands have read one or more of her many books. She has written nearly seventy, none of them great, but all pleasant reading.

Elizabeth Stuart Phelps, the gifted New England woman who wrote *Gates Ajar*, which deals with life after death, was four years old when her father became professor at the Theological Seminary, Andover, Mass. She inherited his student tastes and grew up devoted to books and with a burning desire to help the world. She began to write when only 13 and published many stories both long and short. In *The Story of Avis*, Ma-

donna of the Tubs and A Singular Life, she shows a wonderful sympathy with the suffering hearts of men and women, and also with animals. For many years she was one of the most popular of our magazine writers. After her marriage to Mr. Herbert Ward, also a writer, she lived in Gloucester until she died in 1911.

THE AUTHOR OF THE BATTLE HYMN OF THE REPUBLIC

You may read of Mrs. Julia Ward Howe elsewhere in this book, of her famous and stirring poem which quickened the lagging steps of weary soldiers in our Civil War, The Battle Hymn of the Republic. It was her greatest contribution to American literature but in her long and useful life she found time for much other writing as well as for much lecturing and philanthropic work.

When about 24, she married Dr. S. G. Howe, and went to live in Boston. She was a devoted wife and mother. Delightful socially, her home was always a gathering place for many friends.

Some of our ablest writers have been wise enough to see that human interest lies everywhere. They owe their success to the fact that they have been so keenly interested in the people and places that they know best, that they have been able to tell us about them with charm and vividness.

An unusually sensitive and observing little girl who grew up to do this, was born at South Berwick, Maine, September 3, 1849. Her name was Sarah Orne Jewett and her father was a well-known doctor and surgeon. New England country folks are said to be very reserved and hard to know. You cannot read her stories, Deephaven, Country Byways, The Country of the Pointed Firs, without feeling well acquainted in a delightful cordial way with the seafaring men and the busy stay-at-home women of whom she tells us. She is one of the pleasant magicians of the pen who "hold the mirror up to nature" and show what most of us are not clear-sighted enough to see for ourselves.

Alice Brown is another New England woman who understands the people among whom she lives. She was born at Hampton Falls, New Hampshire, in 1857. She has written Tiverton Tales, Meadow Grass, and Country Neighbors, all collections of short stories, and several novels as well.

STORIES OF THE PEOPLE OF THE TENNESSEE MOUNTAINS

We know about the hard and simple lives of Tennessee mountaineers and of their beautiful mountains from The Prophet of the Great Smoky Mountain, In the Tennessee Mountains, and other stories by Charles Egbert Craddock, whose real name is Mary Noailles Murfree. Her home was near Murfreesboro, which was named after her great-grandfather, a gallant soldier of the American Revolution. The family spent the summers among the mountains, and Mary, who was lamed by an accident when a child and unable to lead an active life, amused herself by studying the mountaineers and their ways, and when still very young she began to write about them.

As she signed a man's name to her stories and wrote in a vigorous style all thought for some time that her work really was by a man.

TWO WOMEN WHO HAVE WRITTEN OF VIRGINIA

Those who love stirring romance, tales of adventures with wild beasts and Indians and lawless men, delight in the stories of Mary Johnston. This gifted Southern woman has been an invalid much of her life but she is able to divert her quiet hours with wonderful imaginings. She seems to see so vividly all that she describes, that her reader feels caught into a wonderland of color and adventure. Miss Johnston is a great student of American history, particularly the history of early Virginia. She throws a spell of romance over the early days in her novels Prisoners of Hope, To Have and To Hold and others. She has written also two thrilling stories of the Civil War, The Long Roll, and Cease Firing; and in Sir Mortimer she has given a vivid picture of life among the great adventurers in Elizabethan days.

Another woman who has written of Virginia life is Ellen Glasgow, who was born in Richmond in 1874. Her best books deal with the years during and since the Civil War. Perhaps The Voice of the People is her strongest book, though many like The Battle-ground.

A GIRL WHOM YOU LOVE IN THE BOOK OR THE PLAY

That delightful girl, Rebecca of Sunnybrook Farm, has a very wide acquaintance with young and old readers, who

have read of her adventures or have seen her on the stage. So has Timothy of Timothy's Quest, and the Carols, of that lovely story *The Birds' Christmas Carol*, and other pen children of the same delightful author.

Perhaps Kate Douglas Wiggin writes so delightfully for and about children because she has long loved them and worked for them. She was only seventeen when she left her home in Philadelphia, where her father was a lawyer, and went out to San Francisco to study kindergarten work. She organized a kindergarten there, and later with her sister, Miss Nora Smith, organized the California Kindergarten Training School. She married in San Francisco, Sam R. Wiggin, a lawyer, who died nine years later. Her books of travel are very entertaining and many stay-at-homes have been abroad in imagination with her *Penelope of Penelope's Progress*. In 1895 she married Mr. George C. Riggs of New York.

THE LOVABLE DOCTOR LAVENDER AND HIS PEOPLE

Just as Miss Johnston's stories hold us by their bold vigor, Mrs. Margaret Deland's hold us by their quiet charm. What is striking and unusual and picturesque interests her much less than the study of human nature, or finding out why ordinary, everyday people act just as they do. She sees and makes us see their mistakes very clearly, but never without kindness. She has loved to develop one special community, a small town of Pennsylvania which she calls Old Chester. Some of the personages of this place appear many times in different stories until they have come to seem very real to her readers. Many love Dr. Lavender, the fine unselfish old clergyman, who has a part in nearly everything that she has written.

A WOMAN WHO HAS WRITTEN OF NEW ENGLAND

Another girl who grew up thinking and dreaming a great deal about the lives of the people about her was Mary Wilkins, later Mrs. Freeman. She grew up in a New England factory town, where she saw many overworked and poverty-stricken men and women, and a great deal of human misery. She felt the grimness of life, and this same sense of hardship and grimness has found its way into most of her stories.

Her first story, *A Humble Romance*, the experiences of a poor little bound-out girl rescued from drudgery and married by a kind-hearted tin pedler, attracted much attention when it appeared in *Harper's Magazine*. Her stories at once became popular. She has written a great deal, but her short stories are better than her longer ones.

The United States is so large that it is difficult to write a book which will make a picture of the whole country. That is one reason why so many of our authors succeed best when they write of the people in that part of the country they know best. We have already mentioned some of these writers, and there are many more.

Many Germans came to Pennsylvania before the Revolution, and among them were some who held religious beliefs that were not allowed in Europe. Those who believed the same thing settled in the same section in the new land of freedom, and even to-day keep up many of their old customs, and hold fast to many of their old ideas. Helen Reimensnyder Martin has written many stories of one of these sects, called the Mennonites, showing their ideas of life, which seem quaint and strange to those of us who live in great cities.

A STORY WHICH HAS MADE THE WORLD LAUGH

Life brings cares and perplexities to all of us as we grow older. When some one writes a tender, loving book that is cheering and encouraging and entertaining it is eagerly welcomed. This is what Mrs. Alice Hegan Rice did in *Mrs. Wiggs of the Cabbage Patch*. Mrs. Rice is a Kentucky woman, living, since her marriage to Mr. Cale Young Rice, the dramatic poet, in Louisville, but spending much time in travel.

Mrs. Wiggs, her most famous story, has been widely translated. It is also published in raised type for the blind so that they may spell out its cheerful lessons of courage and good will with their nimble fingers.

Grace King is another gifted Southern woman. She too writes about the part of the country and the people with which she is most familiar. She is a New Orleans woman and well versed in the history of old Louisiana, as her *Mr. Motte*, *Tales of Time and Place* and *Balcony Stories* show.

Ruth McEnery Stuart is one of the writers whom we enjoy because she tells us tales so pleasantly of the colored people whom she knows and understands because she lived among them most of her life. She was born in Avoyelles Parish, Louisiana, and went to school in New Orleans. Her dark eyes looked very kindly out at the world and no matter how hard life was she was always able to find something humorous and cheering in any situation. She was a greatly valued contributor to our leading magazines and her Sonny stories are also popular.

Julia Magruder was a Virginia woman who grew up during and just after the Civil War. Her first book, *Across the Chasm*, attracted attention, and she wrote *The Princess Sonia*, *Dead Selves* and many other stories. She died in 1907.

THE BOOK OF A BLIND GIRL WHO WENT THROUGH COLLEGE

We have all heard of Helen Keller, the wonderful young woman who although deaf, dumb and blind has succeeded in getting a more thorough education than most people accomplish with all their senses. She keenly enjoys life and in spite of her afflictions is an apostle of good cheer.

She has told her remarkable experiences in her interesting book *The World I Live In*. But it is not only for her heroism in overcoming her mighty handicap that she deserves mention. She has shown poetic ability. Read *The Story of a Stone Wall* and stop to think whether with your two eyes you could have perceived as much or described so cleverly what you perceived as blind Helen Keller has done.

THE WOMAN WHO WROTE OF A NAUGHTY BOY

When *The Madness of Philip* appeared in one of our magazines, readers found the story of the naughty kindergarten child very amusing. It was written by Josephine Dodge Daskam, a New England girl, who shortly before had been graduated from Smith College. She followed it up with many others dealing with child life with a great deal of humorous understanding. She set the fashion of writing stories about children for grown people but has also written about older people very successfully. Now she is Mrs. Bacon with children of her own.

Another woman who has also written

charming stories of children is Mrs. Attwood R. Martin, who writes under the name, George Madden Martin. She was born in Louisville, Kentucky, and educated in the public schools there. She has written several books, but *Emmy Lou* is the most popular. The story of the school life of a little girl has found many readers, and, perhaps, has helped to make parents more patient with children.

OTHER WRITERS OF WHOM YOU HAVE HEARD

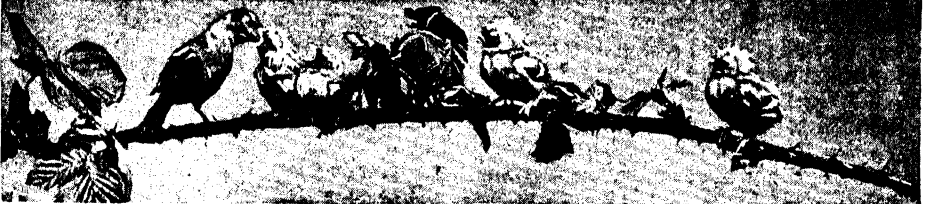
Times have changed since American women began their energetic effort to win a place in literature. Instead of the occasional writer, we now have so many that we cannot keep track of them all. We might go on to tell of others as worthy as those we have already mentioned. There is Mary Raymond Shipman Andrews, the wife of a dignified judge, who writes charming stories of summers spent in the Canadian woods. She loves the freedom and bigness of it all, and makes her readers feel the same affection for the land and the guides, who are so useful. We may mention Mary Roberts Rinehart, who is married to a physician in Pittsburgh, and has a family of adoring boys. Her mystery tales are read by eager thousands and her accounts of the Great War by thousands more; but we cannot find room for them all. The ones we have chosen are writers whom children will like.

There are some other women who are well known, and whose books your fathers and mothers may like. They do not write for children, however, and you will not care much for them until you grow older. One of these is Edith Wharton, who was born in New York in 1862. Her best book is *The House of Mirth*, which is well-written but is very sad. Gertrude Atherton, who was born in San Francisco, California, has written of the West, of the East and of Europe. She has lived in many different places and has studied them all. She is related to Benjamin Franklin.

One great achievement in which our women writers have greatly helped is that we all understand each other better than people did 100 years ago. We have begun to realize that north, east, south and west, in crowded cities and solitary country places, human nature is after all very much the same.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 2161.

WARBLERS OF THE AVIARY AND THE GROVE



One of the handsomest birds, the chaffinch, is a fine songster and builder. It is a devoted parent, and all day carries caterpillars to its young ones. Cruel men trap the males and blind them to make them sing.



The brambling finch is called also the mountain finch. It is like the chaffinch, but less gaily colored.



Linnets have a good deal of red about them when wild, but they become mottled brown in captivity.



Bullfinches are not great singers when wild, but when happy in captivity they can learn any tune.



The goldfinch is an even finer singer than the chaffinch, and thousands are caught and caged.



The common bunting is one of the birds which live in England the year round. Nesting in the grass, it is often mistaken for a lark or pipit.



Reed-buntings are finer songsters than common buntings. While its mate is on her nest hatching the eggs the male sings nearly all night.



All the yellow canaries are caged. There are no wild yellow ones. The canary is a member of the finch family and a great home pet.

The Book of NATURE



SOME SINGING BIRDS

WHEN we have been listening to one of our greatest singers, the highest compliment we can pay the vocalist is to say that he or she sings like a bird. It is a wonderful thing that men and women, with all their art and all the knowledge of voice production which ages of training have afforded them, regard the little feathered songsters of the grove as the highest of all masters of the art of singing. Nearly all birds have voices, but they do not all use them for making music. We may lay down a general rule that the handsomer the bird is, the less beautifully he sings. Why is this so? The answer tells us the whole story of a bird's song.

The song of birds is chiefly the birds' way of telling their love for their mates, or for those which they wish to become their mates. The birds with rich, handsome plumage, or the desperately brave birds, capable of fighting great battles with their rivals, attract the female birds by displaying their lovely feathers, and then by fighting other birds which dare to compete for the love of the lady. The birds which have not gay feathers depend upon the beauty of their song. Birds love birds' singing, and the males which sing best draw to them the females whose love they desire to possess.

CONTINUED FROM 1980



How do the birds make their beautiful melody? They play upon a perfect musical instrument, as a man with an oboe or other reed instrument plays upon his. The voice may be produced at the bottom of the trachea,

or windpipe; or from the place at which the windpipe branches out into the tubes in the lungs, called the bronchia; or in those bronchia themselves. At the point where the two bronchial tubes join there is a tiny elastic membrane. The air from the bird's lungs causes this membrane to vibrate in the windpipe, just as the reed causes the air to vibrate in the pipe of the oboe.

An oboe is not elastic, and cannot of itself utter more than one note. To alter the pitch of the oboe's notes, we have to make holes in the tube, and by stopping these with our fingers we make the vibrating column of air in the tube longer or shorter, as we wish, so altering the pitch of the sound. The bird's windpipe requires no holes or stops. By exercising certain muscles, the bird can lengthen or shorten the tube, squeeze it, or make it looser, and produce an almost endless variety of notes.

Baby seals make a great fuss about going into the water the first time, just as if they were small human beings objecting to a bath. Baby seals, like baby people, have

to be taught to like their bath. In a small measure, birds have to be taught to sing. The voice is there, but not the knowledge of the song. They would sing some song, but whose? A chicken reared in an incubator, and never seeing its parents, chirps and chirrups away as soon as it is born, just as if it had been reared by its mother in the hay nest of a farmyard. It does not try to quack if a duck should hatch the eggs, nor does a duck crow or cackle if hatched by a hen. But many little singing birds, if brought up by strange birds, actually take the song of their foster-parents.

THE LINNETS THAT GREW UP TO SING THE SKYLARK'S SONG

Many years ago a gentleman placed the eggs of linnets in a skylark's nest, and there they were hatched by the skylark. The little linnets, when they grew old enough to sing, learned the song of the male skylark; they did not sing the song of the linnet. Other little linnets were brought up by woodlarks, and they sang the song of the woodlarks; and others, reared by titlarks, sang the song of the titlarks. When they grew up and were placed in cages near ordinary linnets, they kept to the song of their cradle.

But we must be careful not to run away with the idea that all birds copy the song of the birds in whose nests they are reared. What about the cuckoo? The mother cuckoo lays her eggs in the nests of more than half a dozen different birds, but no cuckoo ever tried to copy the note of the birds which reared it. A young canary will undoubtedly copy the note of the birds about it, but if it never heard another bird sing it would in course of time sing some sort of song. It might not be the glorious song which the well-trained canary utters, but it would still be a song which we should not mistake for any other bird's.

THE BIRD THAT SINGS IN A CAGE, AND THE BIRD THAT FILLS SPACE WITH SONG

When we read—as we all must—the books of the great writers and poets who have made the English language so rich in its literature, we continually find the names of song birds mentioned; and many of the sweetest and most familiar poems refer to them, when they are not devoted to one or another of them altogether. It is well, therefore, to learn something about these famous and

familiar birds of our own land and the land from which the founders of the nation came.

We need not have any doubt as to which is the finest of European song-birds. It is the nightingale. Millions and millions of people have to take the word of others for this statement. The nightingale does not reach England until about the middle of April, and two months afterwards it has not a note of its song left. It does not visit Scotland or Ireland. It goes to only two parts of Wales, and seldom reaches a part of England north of Yorkshire; it does not visit northern Europe nor this country so there are more people who do not hear it than there are who do hear it. Another reason why so few people hear it is that, if it should be singing in the daytime while they are about, its song may be drowned by the chorus of other birds; while at night, when it is singing alone, most people are in bed.

THE LIFE OF THE NIGHTINGALE, AND WHY IT SINGS IN THE NIGHT

The nightingale is related to the robin and the song-thrushes, and is about the size of a wood-thrush. It is quite a sober-looking little bird, but there is a beauty about its head and full eye which would make us admire it even if we did not know its name. The males arrive in England a week or ten days in advance of the females. They go to the same places year after year. In the most wonderful way they go straight over the sea and straight inland to the very bush or thicket or tree in which they were born or in which they have previously made their nests.

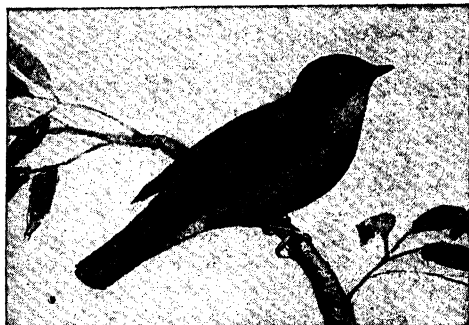
It is when the female birds arrive, and from then until the courting is done, until the eggs are laid and the little ones hatched, that the male nightingales sing their marvellous song.

First of all they sing to attract a sweetheart. Having won her, they sing while they are building their nests. While the mother bird is sitting on the nest the male bird sings almost night and day to cheer her. But when the little naked babies come forth from the shells the song ceases. The father bird has to help to find caterpillars, ants' eggs, little worms, and tiny beetles with which to feed his hungry family. He has no time for singing, and he could not sing

SOME OF ENGLAND'S CHIEF CHORISTERS



The stonechat is a busy insect-eater. It belongs to the chat family, of which there are thirty-six species, all small relations of the thrush. These are the birds called stonechats, but the wheatear is the true stonechat.



The blackcap comes next to the nightingale as a The nightingale arrives in April and sings its magic songster. It is a very welcome summer visitor. song until the middle of June, then sings no more.



Wheatears are the true stonechats. The robin dwells with us all the year, the friendliest little bird, with a grand song and cheerful spirit. A fine builder is the musical reed-warbler. It builds its nest on rushes, as if they had grown through it.



The rose-grower's friend is the whitethroat, which eats the green fly and sings a fine song.

The sedge-warbler is the commonest bird along the marshy banks of the Thames. It loves reeds and willows for its nesting-place.

The whinchat darts from its hiding-place, seizes its insect prey, and then hides again.

if he had the time. His voice seems to go from him, and he has nothing left but a little frog-like croak. If the nest of the nightingale should be robbed soon after the eggs are laid, the nightingale will sing while another is built, and until that lot of eggs is hatched; and very rarely he may sing while a second brood is hatched. Generally speaking, however, his song is not heard after the second or third week in June.

THE MELODY THAT STIRS THE TRAVELER IN THE COUNTRYSIDE BY NIGHT

It is worth going miles to hear a nightingale. There is no other song so wonderful, so thrilling, so beautiful.

Listen to the most beautiful canary; listen to its long-drawn, liquid notes, then imagine those notes in a far fuller, far more exquisite tone, sung by a mysterious bird hidden in a thicket under the starry midnight sky. The long notes and the warbling, rolling notes of the canary do suggest the nightingale, but only faintly. The nightingale is a shy, nervous bird, though he makes his nest near the home of man. But when he has once started his song he seems so carried away by the love of the mate for whom he is singing, and so to glory in his own melody, that then he will sing away regardless of danger. That helps us to understand the following little adventure. A man who had during different years walked many miles to hear the nightingale, and had never succeeded, was told to go to a certain place where the bird might be heard. It was very late at night as he walked up a country lane, and though he crept on tiptoe along by the copse in which the birds were said to be, he could not hear a sound.

HOW A NIGHTINGALE WAS TEMPTED TO SING IN A COUNTRY LANE

He waited a long time, feeling very disappointed. It was just like his experience on previous occasions. "I never shall hear a nightingale," he thought to himself as he turned to walk home. He strode boldly along, for there was no use in being cautious now. But as he walked his foot struck a stone, sending it rattling across the road.

He heard a little "tweet" in the thick trees beyond the hedge which he was passing. It was a little cry of alarm, a note of warning uttered by one bird

to another. Ordinary birds would not be on the watch at this late hour, thought the man. He stood perfectly still for a minute or two, but not another sound did he hear. Being used to the ways of birds, he tried a little trick with which he had often started canaries and other birds singing at home. He whistled in imitation of the canary. It was a soft, low note that he whistled. In an instant there came a reply from the trees. He whistled a little louder, and the bird made a bolder reply. Again and again he whistled, uttering all the bird-notes he could. Each time there came a little longer and louder reply from the trees, and at last there followed such a burst of song as that man had never before heard. It was the song of the nightingale. The bird had regained confidence, and it poured forth its song so fearlessly that the man was able to hurry home and take his friends to hear the wonderful melody.

THE BLACKCAP AND THE ROBIN, THE MUSICAL COUSINS OF THE NIGHTINGALE

When we see a little black-headed bird with a greyish body swallowing numbers of ripe berries of the ivy, we ought to watch while it finishes its meal, then, if possible, follow it to the place where it perches. It is one of the loveliest of the European singers. It is the blackcap warbler, a relative of the nightingale, and, like that king of song, a good friend to man because of the great number of caterpillars and insects it eats. It reaches England in April, after spending the winter in warmer lands, and stays until September. In that time it rears two or three broods of little ones, of which the first lot are generally male birds, and the later broods females. This, by the way, is the order in which many wild birds are born. The blackcap has not only a beautiful song of his own, but can imitate other songs. When caged and friendly with his master, he will learn tunes whistled or played to him.

Another relative of the nightingale is the friendly robin. His home is in England. This does not mean that there are no robins in other countries. Robins are to be seen in most parts of Europe, but those that live in the British Isles do not migrate. They live there all the year round, and are dear to the people for many reasons. Who has not

SONGSTERS OF EAST AND WEST



The fieldfare goes to England in winter, when other birds leave. It lays its eggs and rears its young in lands where the summer is cool.



The young birds in the nest might pass for thrushes, but they are baby blackbirds. The adult male blackbird is a handsome black-coat. The female is a rusty brown, and spotted on the breast. All the young ones are just like her until they have moulted their nest feathers.



The yellow-hammer is a gay bunting. It has a merry little song, which sounds, when put into man's language, like "A little bit of bread and no che-ee-se." It is a yellow and brown bird, and stays all the year.



The skylark, though it nests humbly in the grass on the ground, is the highest flier of the song-birds.



The thrush soon finishes its summer moulting, and renews its song when nearly all other birds are mute.



Gifted with a grand song of its own the mocking-bird mimics everything, from an eagle to a hand-saw.



The red cardinal is the nightingale of the warmer parts of America. The photographs on these pages are by



Jenny wren is always a favorite, for its beauty and its cheerful song.



The redstart is like a stonechat, but far handsomer. It feeds on insects.

The photographs on these pages are by Charles Reid, R. B. Lodge, J. Williamson, and Underwood & Underwood, London.

heard of the robin with his bright red breast, his brilliant, full eye, his saucily cocked tail, his confident manner, and his song so sweet ?

ROBIN REDBREAST AT HOME IN AN OLD BOOT OR A WORN-OUT HAT

He is to be found in every garden. He builds in the ivy, in the bushes ; he builds in the sleeves and pockets of old jackets hung up and forgotten in some outhouse. He builds in an old can or a boot or worn-out hat. The very things which are set up as a warning to other birds, the scarecrows in the fields, are a welcome home to the robin. Anything which has been left by man seems to the robin to be set apart for robins.

He is man's greatest bird friend. Any other wild bird flies away from man as he approaches, but master robin flies *towards* him. While the gardener is at work he will stand by to snap up the insects, grubs, and worms that may be turned over in digging.

There is a very close friendship between man and the robin. But a robin should never be caged. He would die of misery if alone, and if kept with other birds, even with other robins, he would fight and kill them. Young robins which are strong enough will fight old robins, and, if they can, will kill them ; and old robins will kill young robins if their paths cross.

It is unfortunately true that our little friend is the most vicious of all the garden birds. Wise men have wondered how this is. The fact that young robins of the same nest fight against each other is not altogether surprizing, for all birds fight. Watch young chickens and we see that at once ; if one of them turns weakly the others will kill it.

HOW ROBIN REDBREAST SINGS MERRILY THROUGH THE WINTER SNOWS

Well, this is what the wise men think about the robin. For ages and ages the robin has made himself the friend of men. In the old days, when there were no windows to the houses, robins would fly through the openings and make their nests and find their food in the rooms. Now the robin, claiming man as his special friend, is jealous of other birds which approach his friend, and tries to frighten them off by attacking them.

With all his faults, everyone loves the robin. All birds cease to sing after the

full heat of summer sets in. After the rearing of their little ones they moult, and in that time do not feel well enough to sing. The cheerful robin is the first English bird to begin to sing again. He may begin in August or September ; he is in almost full song by the beginning of October, showing the joyful thrush how to tune up and defy the gloomy thought of the dark winter days to be. He is not at his best in song until February, but all through the winter his brave little heart impels him to sing of the good days that are coming, as if to tell his friend, man, not to mind the winter days, but to look forward to the gladder times that lie ahead when his full song shall declare that "Spring is here."

Our own robin is not the same bird as the English robin. It is much larger and leaves the northern States in cold weather.

THE WHITETHROAT, THE WHEATEAR, THE SEDGE-WARBLE, AND THE STONECHAT

Now comes another of the nightingale's little kinsmen, the whitethroat, a glorious singer. The general color of the bird is greyish, though it is tinged with brown on the back and is white underneath. The length of the body is about three inches and the tail about two and a quarter inches. Like the robin, it lives mainly on insects and caterpillars, until the autumn, when it will take berries and fruit. When singing, the whitethroat ruffles up the feathers round his throat and his head so that the latter appears crested.

Its food resembles that of another songster, the wheatear, a bird of the same size, but whose feathers are light to dark grey on the head and neck, brownish-grey on the wings, on which appear grey feathers edged with yellow. Underneath the bird is mainly orange-brown, but in the tail are white feathers tipped with black. The wheat-ear spends the spring and summer, but cannot endure the winter in Great Britain, and so must fly over the sea to where the air is warmer. There are several sorts of wheatears. The common one is called the stonechat as well as other names. This is confusing, for there is another fine little bird which spends the summer there known as the stonechat, a merry little bird, having a red breast like the robin, but black on the throat and upper

parts. This one generally goes away for the winter, but at the same time other members of the same family reach the British Isles to escape the greater cold of the winter in the lands where they have spent the cooler summer.

All these birds of which we have been reading belong to the family of warblers. There are many of them, the hedge-sparrow, the redstart, the reed-warbler, the sedge-warbler and others. The sedge-warbler is more common than the reed-warbler. It nests in thick reeds or willows near the water, whence its cheerful song may be heard, in the season, early and late.

The reed-warbler is one of the bird architects. It plait its nest on the stems of reeds or rushes, three or four of them becoming part of the nest. The grass and leaves and wool of which the nest is made are twisted about the stems, which look, when all is finished, as if they had grown through a nest which had been already made. The nest is deep and cone-shaped, so that, no matter how the wind blows, the cradle will not fall nor the little ones in it be in danger.

THE CRUEL SHOWMEN WHO DESTROY THE SIGHT OF BIRDS TO MAKE THEM SING

Now we pass to the finches, a big and interesting family, containing some of the most attractive birds. Let us take the chaffinch first. The bird-fancier will tell us that it is not a finch at all, but a sort of link between the finches proper and the buntings. It is a splendid-looking bird, with fine color, and a crest which can be raised at will. It eats insects and vegetable food, and for the latter it pays a heavy price to the stupid farmers, who shoot it. The farmers forget that the chaffinch destroys an enormous number of insects.

Chaffinches are often caught and tamed. They sing beautifully when once they have got used to confinement. In some places men have contests between their chaffinches. The bird sings a song in which the notes generally follow in regular order, and the bird which utters most notes without a stop wins the prize. But there is a frightful scandal behind these competitions. Most of the birds which sing in them have been blinded by their owners. These cruel monsters draw red-hot wires across the eyeballs

of the birds, completely destroying their sight.

THE PITILESS MEN WHO CATCH THE ORTOLAN, AND THE LITTLE BIRD'S SAD END

Then the poor things are taken to the place where the contest is to be held. A cloth covers each cage. When this is removed the bird cannot see, but it hears the twitter of another chaffinch, and thinks that it is again free in its native grove, being challenged to combat by a rival songster. And that is why the poor blind birds pour out their hearts in song, seeking to make their music better than that of the other little victims which they hear.

Having spoken of buntings, we had better note them here, though not all of them are good songsters. The one that we see in European farmyards in winter, hopping about with the chaffinches and sparrows, is the corn-bunting, which in the summer lives in the cultivated fields, and is caught in large numbers by the wretches who snare larks. It is taken in the same nets with those little princes of song. One of the buntings is the ortolan—a bird which breeds in great numbers on the continent, but rarely visits Great Britain.

The ortolan is a handsome little bird with a curious song, but nobody seems to care about it, except as a delicacy for the rich man's table. Thousands of the birds are caught in nets on the continent, then sent alive to England, where they are kept in wretched baskets or cages in dark rooms, and fed to make them very fat, ready for eating. That is the fate of every ortolan which is caught by these pitiless men.

MERRY LITTLE BUNTING BIRDS AND THE BULLFINCH WITH THE GAY RED BREAST

The snow-bunting comes southward in winter, but our summers are too hot for it, so it returns then to the Arctic Circle. The reed-bunting is like the nightingale in so far as singing at night is concerned. While the female is sitting on her eggs, the male bird perches at her side, and carols the dark hours away. Another famous bunting is the yellow-hammer—a biggish bird, bright yellow and brown in color. It has a merry song, and is supposed to sing "A little bit of bread and no cheese."

Keeping to the finch family, we must take a peep at that handsome black-cap,

the bullfinch, with his gay red breast and shiny black tail and barred wings. He has a strong beak for so small a bird, the reason being that his favorite food, when he can get it, is fruit-buds. That raises an interesting point as to whether he is more a friend than an enemy to the fruit-grower. A couple of bullfinches have been known in the course of two days to take every bud on a big plum-tree. That is very bad for the man who has only one tree; but their habit is not to eat all before them on one tree, but to take a few buds here and there.

WHEN THE BULLFINCH FORGETS HIS SONG AND LEARNS HIS LESSON AGAIN

If the bullfinches did not take them, the gardener would have to prune them away. A skilful man cuts thousands of buds from his trees, for if he does not the trees will never be able to ripen them, and the fruit will be poor and small. The bullfinches, therefore, help the grower in pruning. As a songster the bullfinch is a greater artist in captivity than when free. His natural song is not much to boast of. If caught when young, he can be taught to whistle any tune, and whistle it most beautifully. The funny thing is that the first time he moults he may quite forget his song, and have to re-learn it. He is an affectionate bird, and when regularly fed by one person gets very fond of him, and will not go away, even though given his freedom.

It may surprise some of us to remember that the canary is a finch. Look at the greenfinch, the cousin of the linnet and of the canary, and then we understand. In its native home, in the Canary Islands and elsewhere, the canary is colored very much like the greenfinch. It is by the careful selection of birds that men have got the yellow canaries. Those which have brown and green about their feathers have had linnets or goldfinches among their ancestors. The red ones have been fed, when moulting, upon cayenne. There are no wild yellow canaries.

THE MANY KINDS OF FINCHES AND THEIR MELODIOUS SONG

The canary has the most beautiful song of any ordinary cage-bird, and some of its notes, as we have already read, are really like those of the nightingale. They are dear little birds to keep, and live for many years. One which lived

in Hertfordshire when this story was written was already fifteen years old, but it was singing splendidly, and behaving towards its master and mistress with all the affection and intelligence of a pet kitten. The linnet—another finch whose song resembles that of a canary—has red on his head and breast when wild. After being caught it loses its red feathers at the first moult, and becomes quite brown all over. We must not forget the brambling, or mountain finch. Nor must we overlook that handsome favorite, the goldfinch, which is a joy to see as it whisks along chasing the thistle-down it loves, all the while uttering its melodious song. It cannot be mistaken for any other bird, its orange tints making it noticeable.

Of course, stupid farmers shoot it, yet few birds do more good for them. In the spring and early summer the goldfinches devour swarms of harmful insects, and later in the year they live entirely on the seeds of weeds, which are among the plagues of the farmer's life.

A closely related bird is known in this country as the goldfinch.

THE BLACKBIRDS AND THRUSHES, THE LIVELY SONGSTERS OF THE GARDEN

We come next to two charming related birds, the blackbirds and thrushes. The blackbird is a thrush, but the thrush is not a blackbird. The fieldfare and redwing, too, belong to the thrush family. The largest of the family is the missel-thrush, but its song is not so rich as that of the song-thrush. It is beloved by aviary-keepers for the readiness with which it will bring up the young of other birds which have died. After the nesting period, however, it is apt to be vicious with birds smaller than itself.

Some people like the music of the thrush almost as well as that of the nightingale. We may smile at it, but the beauty of the thrush's song can be proved when we are listening for the nightingale. In a certain copse there are nightingales, thrushes, and blackbirds. Now, when the nightingale is in song, we drive in the daytime to this place to hear it. As we draw near, we hear a bird trilling away with great power and sweetness. "Is it the nightingale?" we ask ourselves. "Yes, it is," we say at first. But we listen and listen as we draw nearer, and we find that it is not the nightingale; his famous liquid notes

are missing, those notes which none but he can utter. But the other parts of the song of the thrush—for he is the singer—are so fine that we mistake them in the distance for those of our grandest chorister. The thrush may become a little tiresome by the unwearying way in which he will utter call after call in notes which become as regular and monotonous as those produced by a machine. Still, we cannot have everything we want, and we must be thankful for what the thrush is content to give us.

HOW THE BLACKBIRD DESTROYS INSECT ENEMIES AND STEALS CHERRIES

Next to the robin, the thrush is the most cheerful of all European songsters. He soon gets over his molting, and by the end of October is singing an anthem of hope and goodwill.

The blackbird, cousin of the thrush, is the larger bird of the two, and very handsome, with his sheeny black feathers and his orange-colored beak. He is a great songster, with his loud, mellow piping, but he is not so good a performer as the thrush, because in his song occur harsh, unlovely notes which crop up in the middle of some fine strain, making it all ridiculous. In gardens and orchards, where they are not persecuted, blackbirds and thrushes congregate in great numbers. Fruit-growers do not love them, for they undoubtedly do great damage to fruit. Earlier in the year they work like giants for the farmer by eating snails and worms and grubs, but when the fruit is ripening they play havoc. In one big garden, not a single ripe pear or apple was picked which had not been bored by the sharp beaks of these hungry birds.

Let them have the run of a cherry-orchard, and they are worse still. They are always hungry, and a gentleman who grows many cherries reckons that these birds take a third of his crop. He bought a gun to fire at them, not to kill them, for he did not use shot, but simply that the bang might scare them away. At first it frightened them greatly, but soon they got used to it. He would go out and see the birds in the trees gobbling down his cherries. They would see him,

too, and they did not wait to be fired at. Each bird would snatch off a cherry and drop with it in its mouth to the foot of the trees, and cower down among the grass there while it ate its stolen fruit, then fly away with shrill pipings and chattering.

America has a bird called a thrush which is not a thrush—the mocking-thrush, or mocking-bird. It is the most wonderful of all song-birds. It has a glorious song of its own, but it is not content with that; it mimics the song and cries of every other bird. It can copy a nightingale's song, it can utter the harsh shriek of the eagle, the cackle of poultry. It can bark like a dog and mew like a cat. It can imitate the sound of a saw, the creaking of rusty hinges, the blows of hammer and mallet.

It never imitates the human voice, though it will learn a long tune whistled to it. The mocking-bird is common in America, and is much prized for its wonderful gifts, and admired for the courage with which it defends its young from birds of prey and from snakes and cats. In size it is rather larger than a thrush. It comes between the wrens and the family to which those splendid songsters, the bulbuls, belong.



* GREENFINCH AND NEST

In praising the birds for their song in winter, we must not forget the little wren. This is, indeed, a happy little creature. Its sweet song may be heard for the greater part of the summer, and, once the bird has done molting, it needs but the faintest flicker of sunshine on a winter's day to set the feathered mouse trilling.

HOW THE WRENS CUDDLE DOWN IN THEIR COSY NEST IN THE WINTER

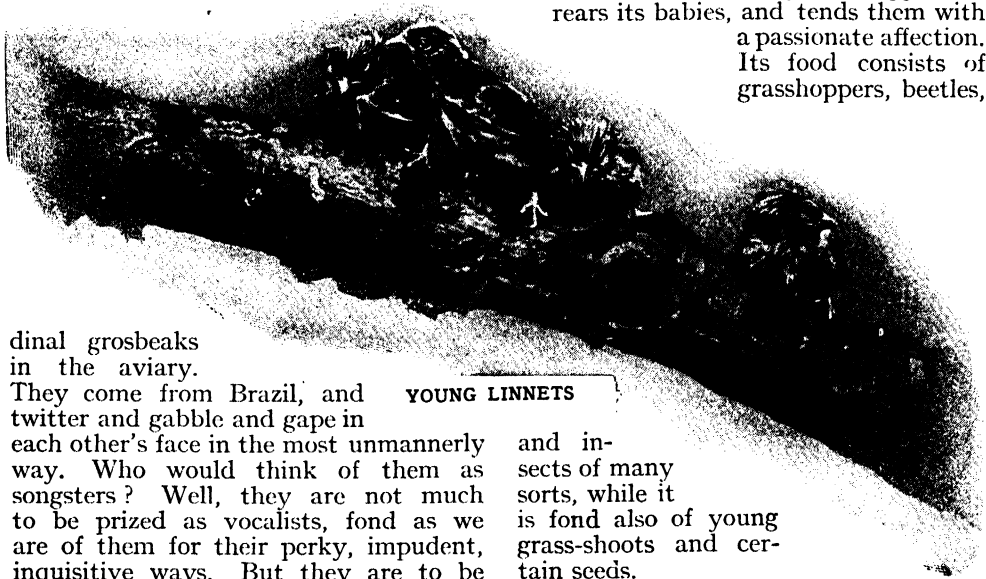
Of course, it is not a feathered mouse, but many of us call it that because of the way in which it runs and darts in and out of the hedges and bushes. It looks just like a field-mouse. It is the neatest, trimmest little bird we have, and, with its tiny beak and saucy little tail, it is just the bird that most of us would have created for a pet, if we could create a bird at all. As we have seen, this little wren has a very remarkable cousin, the lyre-bird being in reality a wren. In the winter many wrens cuddle

together for warmth in the same nest, and a very fine little nest it is, with a dome for dignity, and with strength fully equal to holding the many residents which live there during the winter. Very different is this bird from the robin, who will not have his fellows near him after certain periods of the year. He gives up his nest as soon as his babies are big enough to kick one another out, and then takes himself to casual lodgings, roosting wherever it pleases him.

Now let us take one glance at the car-

winter, and men make a living by trapping them to sell for the food of men who care not for the beauty of a bird's song or shape, but greatly rejoice over something to eat which other people cannot, or would not, have.

The lark soars so high that we do not always remember that it is a good seven inches in length, including the tail. The funny thing is that, while it flies higher than any other songster, its home and food are on the ground. The nest is made in some hollow in a field, often in the place where a horse has set its hoof. There it lays its eggs and rears its babies, and tends them with a passionate affection. Its food consists of grasshoppers, beetles,



dinal grosbeaks in the aviary.

They come from Brazil, and twitter and gabble and gape in each other's face in the most unmannerly way. Who would think of them as songsters? Well, they are not much to be prized as vocalists, fond as we are of them for their perky, impudent, inquisitive ways. But they are to be respected for their grand relations, the other cardinal grosbeaks, our own Virginian nightingales. These can sing, and their scarlet feathers form a stately garb for birds so accomplished.

One of the most celebrated of songsters brings up the rear of the procession. It is the skylark, the bird which has inspired some of the finest poetry ever written. It is a shameful thing to those who love birds that thousands of Europeans never see a lark except in a poultry-dealer's shop. The flesh of the lark is not nice to eat, but it is the fashion among a certain class of people to eat it. Towards the end of the year larks assemble in great flocks near their summer haunts. The old birds and the birds born during the summer are joined by thousands of larks who fly over the sea to spend the

Photograph, copyright by Underwood & Underwood, N.Y.

YOUNG LINNETS

and insects of many sorts, while it is fond also of young grass-shoots and certain seeds.

It is not the earliest riser, although we say "up with the lark." To tell the truth, the pet doves seem to be the earliest to wake. They start crooning before the day has come. They are quickly followed by the thrushes and blackbirds, but the lark gets up when the sun has somewhat aired the world. When he does rise, he rises indeed. We do not know where he is. From somewhere near heaven's gate, as it seems, there floats down to us a glorious melody as from some wonderful spirit bird. We look upward, and away up in the sunlit clouds we dimly see a speck. It is the lark, thrilling the beautiful air with the magic of that song which has so often echoed and re-echoed in the heart and brain of the poet.

THE NEXT STORIES OF BIRDS BEGIN ON 2213.

The Book of FAMILIAR THINGS



WHERE OUR WATER COMES FROM

AS you drink a glass of water on a hot summer day, or fill your bath with clear, cold water from the city tap, do you ever stop to wonder where it all comes from? Thousands of other children, perhaps hundreds of thousands of people, are drawing water from city taps, drinking it, cooking with it, bathing in it, washing clothes in it; it is used by thousands of gallons in factories, and yet it never, never stops. Millions of people all over the country are using water from wells, from rivers and lakes. Where does it all come from? How does the water get into the wells? How do the millions and millions of gallons of water that are used every year in our great cities get into the water pipes through which it comes to us?

To answer these questions, we must go back to the beginning of things in the world. Water is older than any animal that lives, older than the grass or the trees, or any living thing on the face of the globe. Without water nothing could live, and the whole earth would be as dry and arid as the desert of Sahara.

But, you say, you have not yet told us where water first came from, and in reply we can only say, no one knows. You remember how we read in the story of the Earth, that when this world began to cool, the water in it was in the form of gas in the air. As the earth cooled still more, the water vapor cooled also, and at

CONTINUED FROM 2004

length it condensed in the form of water.

That water now fills the ocean that covers nearly three quarters of the earth's surface; it lies in placid lakes, it rolls along the great river beds; dashes down the face of the great hills in mountain torrents; it comes out of the ground in bubbling springs to run away in rills and brooklets, that seem to sing for very gladness that they have escaped from the dark recesses of the earth.

But though the air parted with its water vapor, and became clear, it still holds a great deal. The oceans and seas and lakes give back some of their water to the air by evaporation. Even the water that we drink is only borrowed. Four fifths of the weight of our bodies are composed of water, but with every breath that we breathe out, we are giving it back to the air in the form of vapor which we can see on a cold day when it condenses quickly. All the animals and all the trees and plants give back the water which they drink up so greedily. All this water vapor condenses again and falls in rain. Some of the rain of course falls back into the sea; but much of it falls on the land, to water the earth. Most of it sinks down through the ground until it reaches a hard layer of rock or clay, through which it cannot pass. If it can find no outlet it makes a way itself underground through the porous rock, or gravel, or clay that lies above the hard rock until it reaches a fissure

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in the ground where it can spring upward, or the face of a mountain, or hillside where it bursts out to the light of day to commence the circle all over again.

HOW THE FIRST WELLS WERE MADE

Now this answers part of our questions about wells. Men build a wall around the fissure springs, to prevent the water from running away, and to keep out the surface water which would carry impurities into it. Wells like these were probably the first that were made, but they are not now often used in our country. As you can see easily, it is very difficult to keep their water pure. Therefore it is much better to dig deep wells.

It is a long time since men began to think of digging down into the ground in search of water. At first of course they did not dig very far. The tools they possessed did not permit them to do that. Very often, they could reach the water that was making its way underground, and as soon as an opening was made, it welled up, and filled the square or circular cistern made to hold it. Frequently, however, it did not reach the top, and then a pail or bucket had to be let down on a long rope to reach it. It is of wells like this that we read in the Bible. Such wells are still dug, and though in our day pumps are generally used, the "old oaken bucket" or something like it may still be seen in our own country. Pumps are used for wells when they are covered in at the top for safety's sake as well as to prevent leaves and dirt from blowing into them. Sometimes it is necessary to bore down a thousand feet or more before water is found. When boring is done, the well is called an artesian well. The work is done in the same way as boring for a salt well, except that only one pipe is used.

When white men first built towns in this country, and for very many years after, the people were content to carry water into their houses from street pumps, or, if they were fortunate enough to possess them, from wells in their own yards. As the towns grew into large cities, however, it was found that the well water did not give a sufficient supply. Besides it was impossible to keep the water pure, and the health of the people suffered. This would not do, and the cities began to bring water from a dis-

tance, and now even quite small towns are supplied with water which is brought into the houses in pipes.

HOW WATER IS STORED AND PURIFIED FOR USE IN OUR CITIES

For this purpose the water is stored in large reservoirs, as we read in the story of the New York reservoir, on page 5193. That great reservoir is filled by pure water from mountain springs and streams, but not all cities are fortunate enough to be able to get a supply of such purity. In nearly all cases the water must be filtered, and in many cases it must be allowed to settle, before the filtering process begins. We shall suppose then that the water supply for a town comes from a river which is likely to contain fine particles of sand, or leaves, or from some source of supply, the water from which has become a little impure. In such a case, the water is first led from the river, or pumped from the well or lake, into a reservoir where it is allowed to lie till the heavy particles, which the water carries with it, have settled to the bottom. Then it is allowed to flow quietly into the filter. This is a water-tight reservoir, of which the bottom is covered with about twenty-four inches of gravel, very coarse at the bottom, and fine at the top. Over the gravel is spread three or four feet of sand, and through this the water filters.

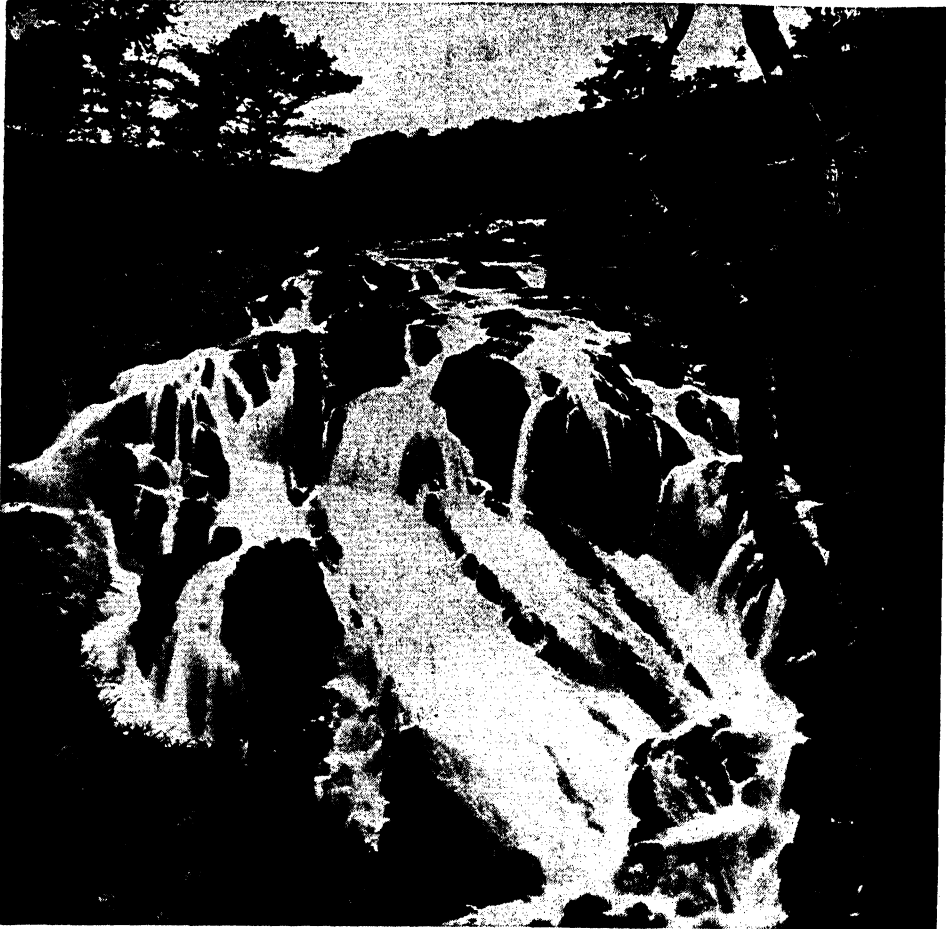
As the water sinks through the filter, the tiny microbes and other impurities which would make it unhealthy are left behind on the fine sand. If the filter beds are well built and kept clean, the water as it is brought into our houses from them is very pure.

SOME WATER NEEDS TO BE CHEMICALLY PURIFIED

We know that oxygen is a great purifier, and where filtering is not needed, or as a precaution, aerators are often used. Air is forced through the water as in the case of the New York water supply, or the water is sent dashing over a weir in a waterfall. In nearly all cases a small quantity of chlorine is used to kill germs, before the water is filtered. There are other filters that we cannot speak of here. Those that we have described are the most common. From the filters the water is led into the large water pipes which carry it to the town or city, and there distributed to our houses.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 2253.

HOW THE WATER COMES TO US



Few things are more familiar than the ordinary water-tap in the kitchen or bathroom, yet it is quite a wonderful story how the water that flows when we turn on the tap is brought from the distant hills into our homes. Here we see a fine mountain torrent, with the water foaming on its way down to the valley, and we shall endeavor to follow the course of this water until it is ready to rush forth from the tap in our kitchen.

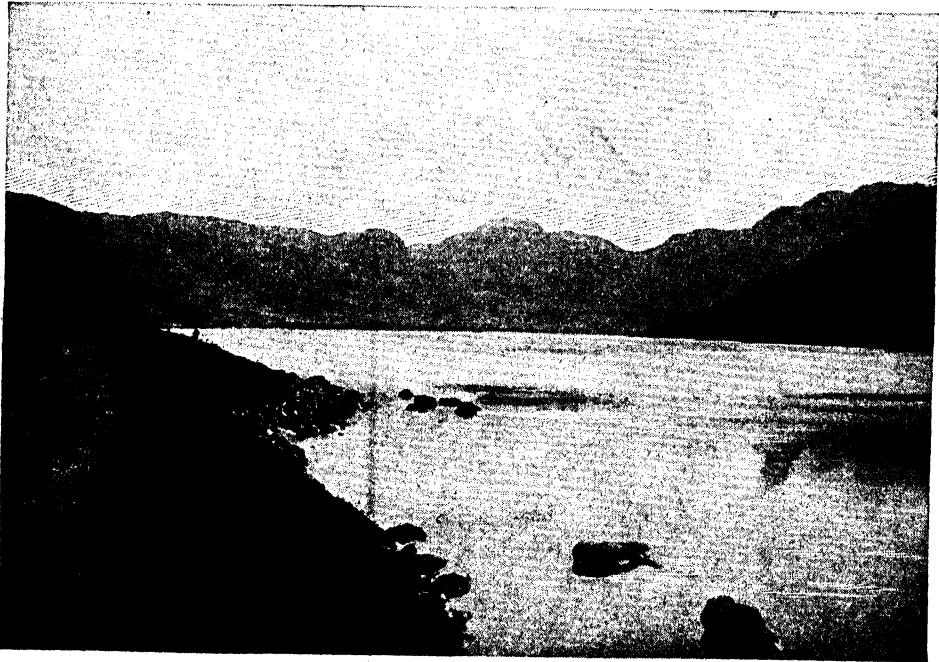


Water, of course, always flows downwards from the high hills into the valleys, and the stream we see in this picture is on its way to the lower valleys, where it will become a river, flowing smooth and wide. So it would continue to flow until it lost itself in the sea, but that man by his ingenuity can capture it and make it flow as he wishes, and even force it to rise up as high as the tallest house that was ever built.

THE RIVER RUNNING INTO THE LAKE



The stream has now become a river, watering the fertile plain into which it has descended from the mountains in the distance. But before long man will step in with his wonderful works and stop its onward course, so that this continuous supply of clear, fresh water may be turned into the service of the crowded cities.

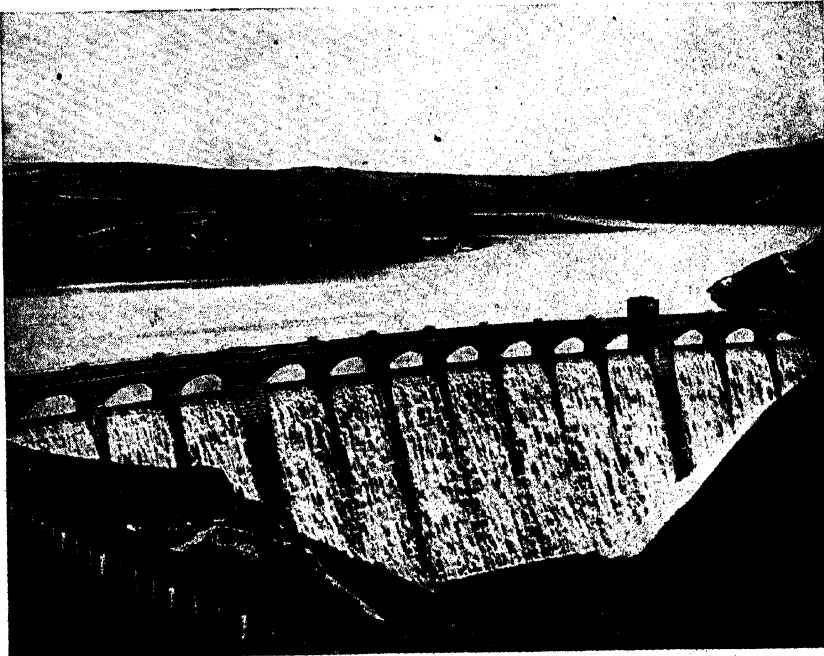


Here we see the water no longer a stream, but lying wide and still throughout the whole length of another great valley. This is one of those natural bodies of water called lakes; but even a lake must have an outlet, for the river which runs in at one end must find its way out at the other, though it may do that by underground channels and not in any visible way. Here man begins his work to save the water for his use.

THE LAKE BECOMES A RESERVOIR



The first thing that man must do is to prevent the water that flows into the lake from flowing out again, and this he does by building a dam across the end, like that seen in the above picture. It is a long, slow, and very difficult undertaking, as the water has to be kept away from the dam while the dam is being built.

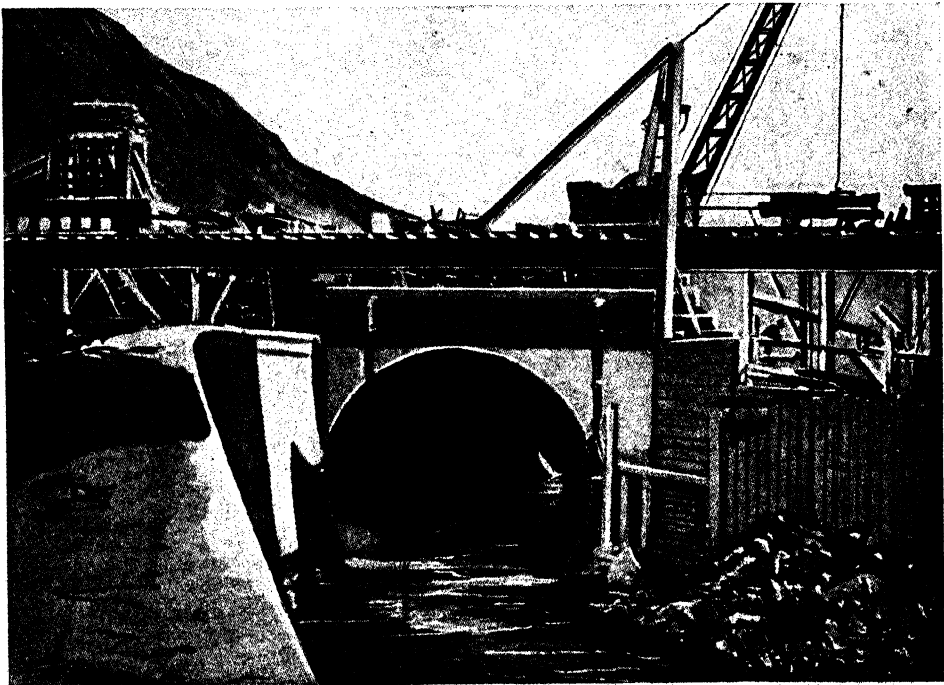


If a dam were simply built solid across the bottom of a lake, the pressure of the water would break it down in times of great flood, and to avoid this spaces are left, or gates that may be opened, so that when too much water collects in the lake it may run off as we see here. The lake has now become a reservoir.

THE GREAT PIPES THAT CARRY THE WATER



The next stage in the journey of the water from the mountain to the city takes it through great iron pipes from the main reservoir, illustrated on the last page, to the local reservoir, where it is ready for going into smaller pipes, and so to the houses. Here we see one of these great main pipes being drawn by the horses.



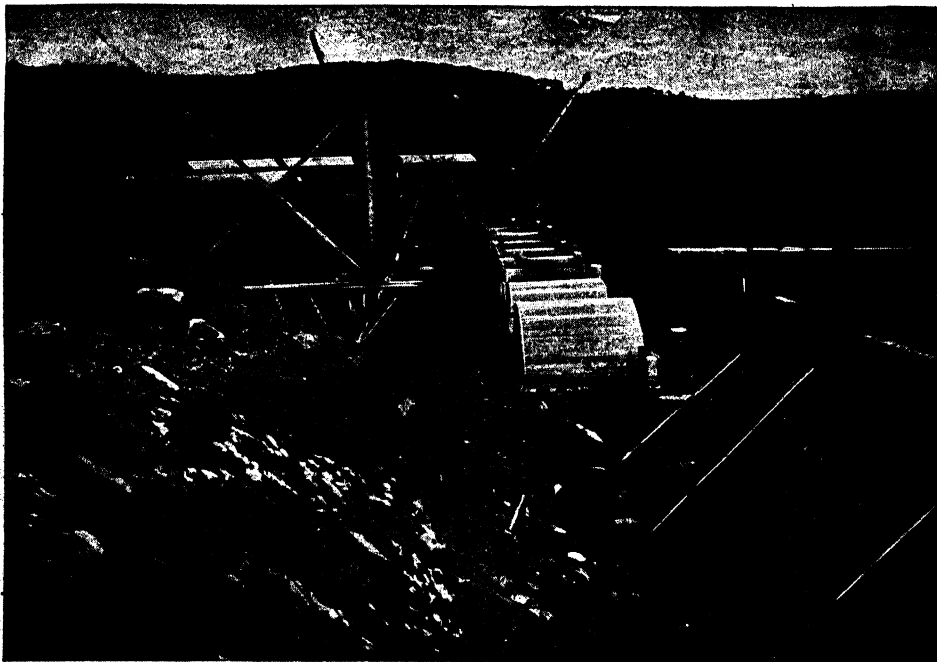
Here is a main pipe with water flowing through it as it arrives at one of the reservoirs. Sometimes, of course, great volumes of water will pour through, but that depends on the amount of water that may be in the first main reservoir. From the main reservoir to the local reservoir may be a distance of many miles; and the main reservoir must be higher than the local reservoir, so that the water may flow continuously.

IMPRISONING THE RIVER IN THE EARTH

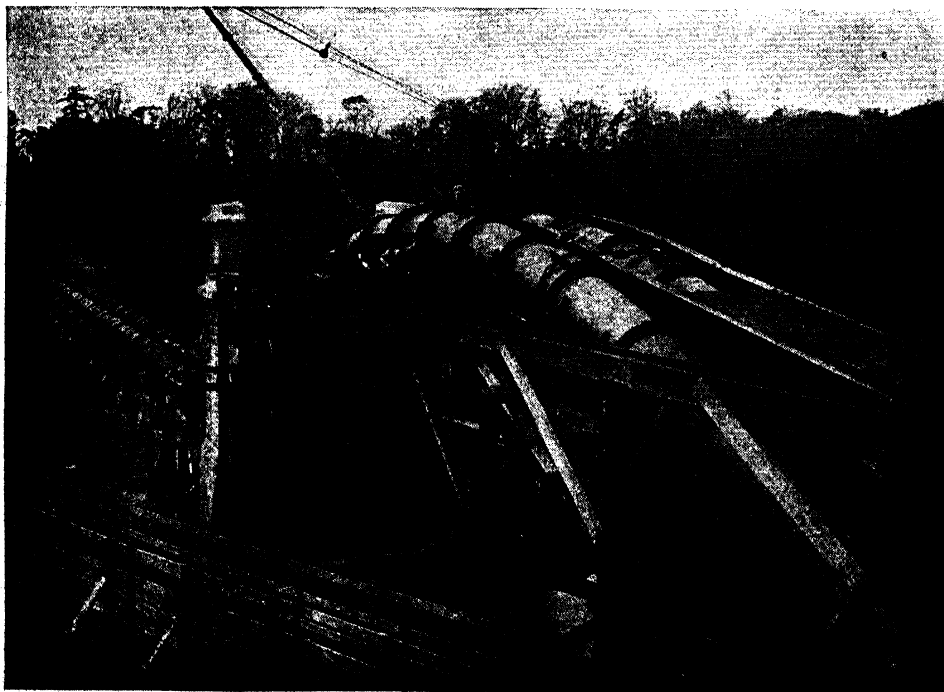


When we think that great pipes such as these must be laid underground, often for over 30 or 40 miles, we can imagine how vast is the work of conducting water from its native mountains to the local reservoir.

CARRYING A RIVER ACROSS A RIVER

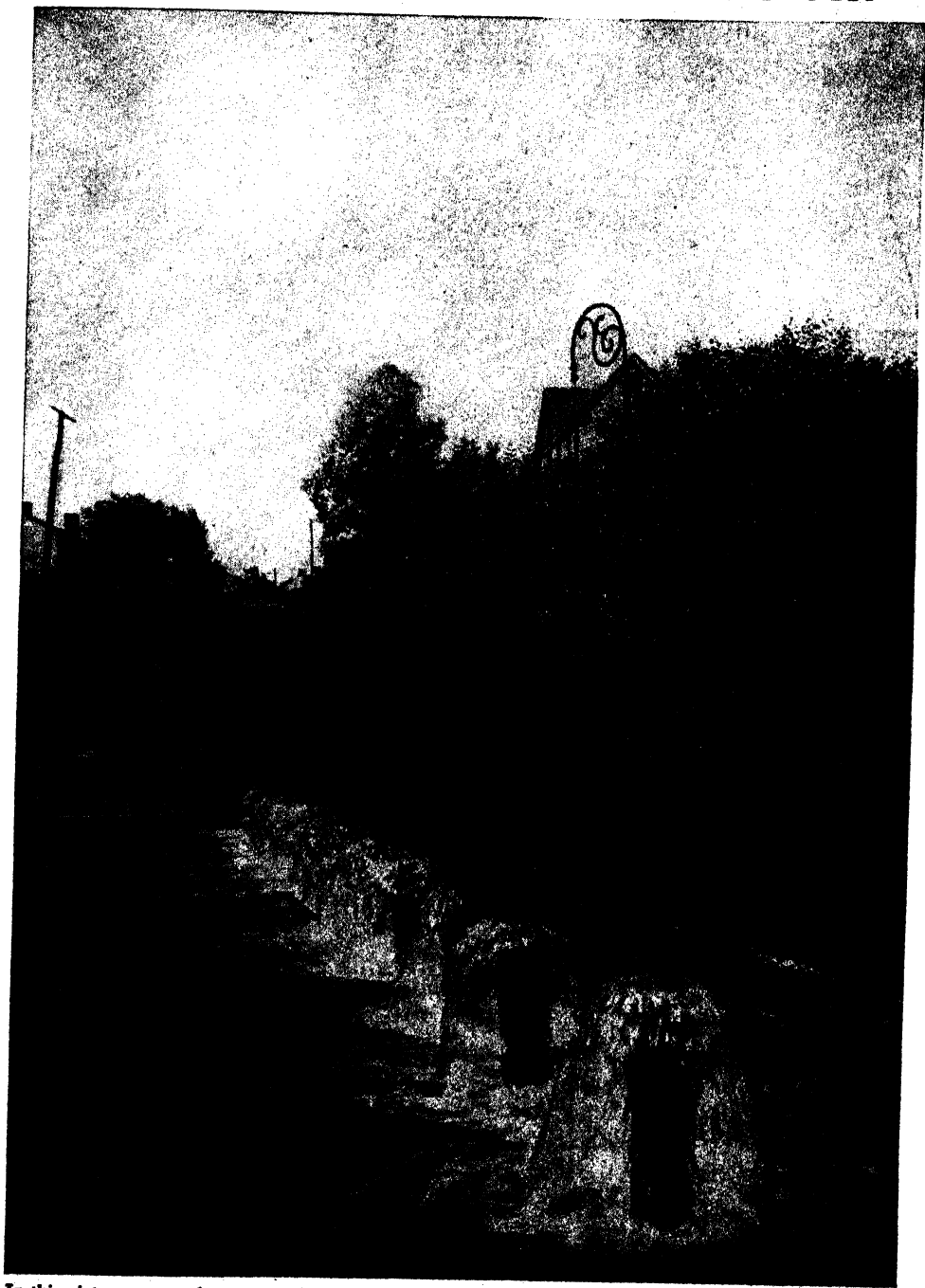


Not merely have the main pipes to be laid under the ground in deep and wide trenches, but there are, of course, rivers to be passed and valleys to be crossed, and over these or under them the pipes must go. Here we see a bridge being built across a river simply to carry the water-main to the reservoir. The round tunnel on the far side of the unfinished bridge is the underground channel along which the water-pipe will go.



This picture shows us how the engineers carry the pipes across the bridge. We see them making first an immense arch of the water-pipes, and then a long bridge of them across a road and over a river, to bury them again in the ground ; and so on, over any obstacles, until the locked-up river reaches the reservoir.

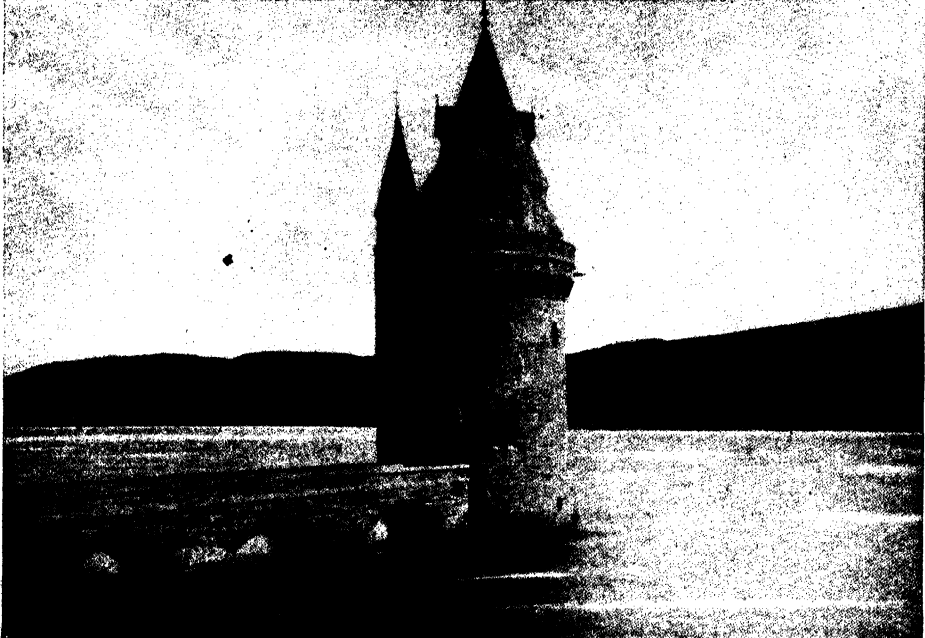
WATER RUSHING INTO A RESERVOIR



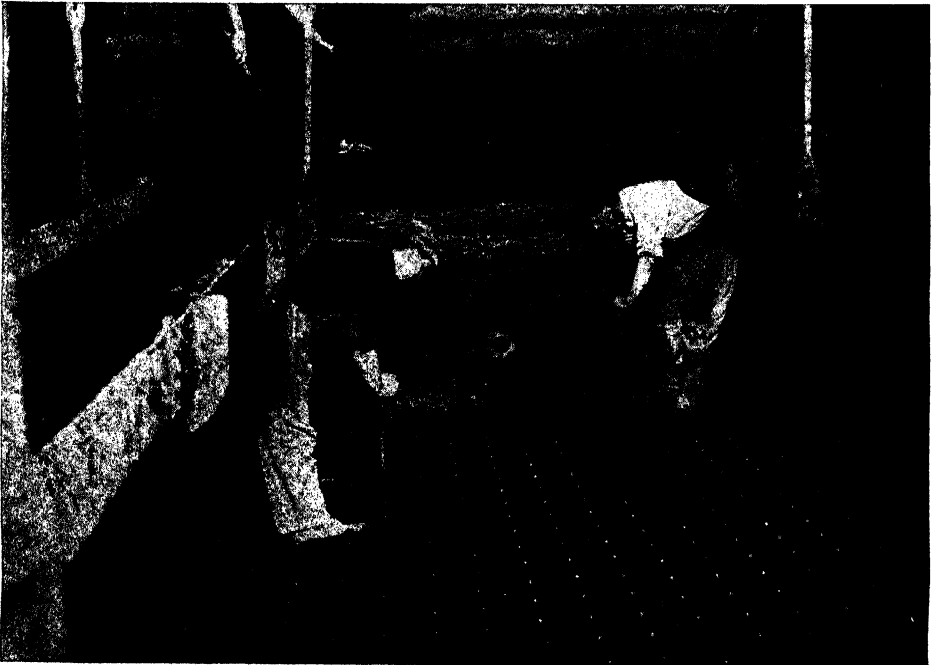
In this picture we see the water rushing through a row of large pipes into a reservoir. From this reservoir it is allowed to flow very gently into the filter. The walls of the reservoir and filter are made water-tight so that none of the water that drains off the surrounding country can get into it. One of the problems that engineers have to meet in providing for the water supply of a city, is the difficulty of keeping surface water out of the reservoir.

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HOW THE WATER IS MADE PURE



The water, when it arrives in the local reservoir, is not, of course, perfectly clean and fit for drinking. It has to undergo the simple process known as "filtering," and there are different ways in which this may be done. Sometimes we see a large tower-like building known as the receiver, through which all the water flowing from the reservoir passes on its way out to the pipes of the town, and in passing through it is filtered by means of charcoal which lets water pass, but keeps back particles of earth and other matter.



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Although the walls of a filter are water-tight, the water must be able to find its way out after it has sunk down through the gravel with which the bed of the filter is covered. In some cases this is done by boring holes in the floor of the filter as shown in this picture. After a time the holes become clogged up, and the gravel is then taken off and washed, and the holes are cleaned out as you see in this picture.

LAYING THE WATER IN THE TOWN

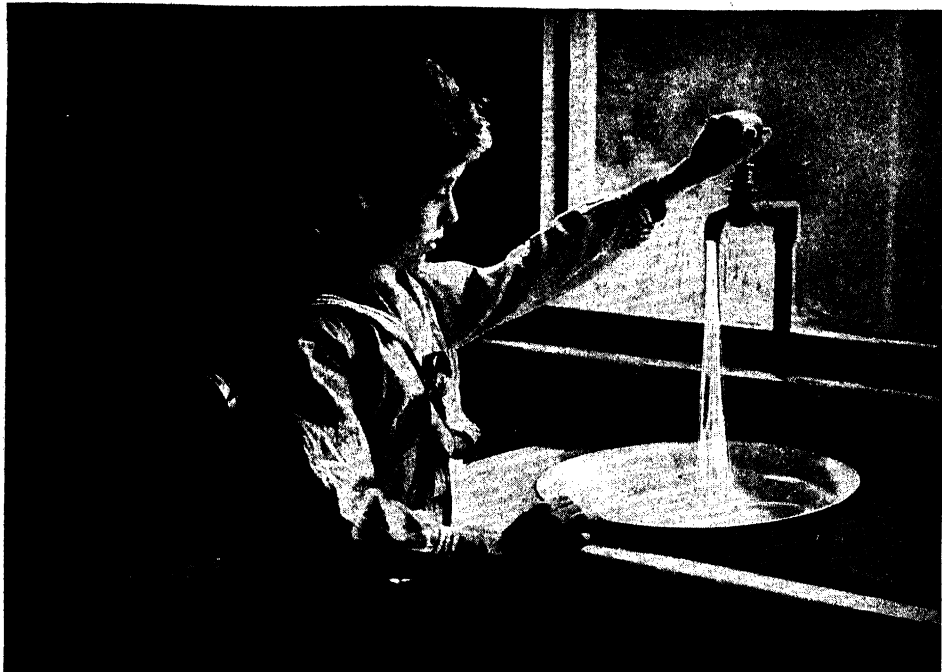


The laying of the ordinary water-mains through the town is another great task. Let us suppose that a new reservoir has just been constructed in the scene of this picture. Along come the strong laborers with their picks and other tools for breaking up the earth. Here they are beginning the work.



Having broken up the ground, the men with their picks and shovels soon cut out the trench in which the water-pipe is to lie. This pipe is not so large as those carrying the water from the lake to the reservoir, and smaller pipes are laid from it into the houses, and smaller pipes still through the house to the tap.

HOW A BOY TURNS ON THE RIVER



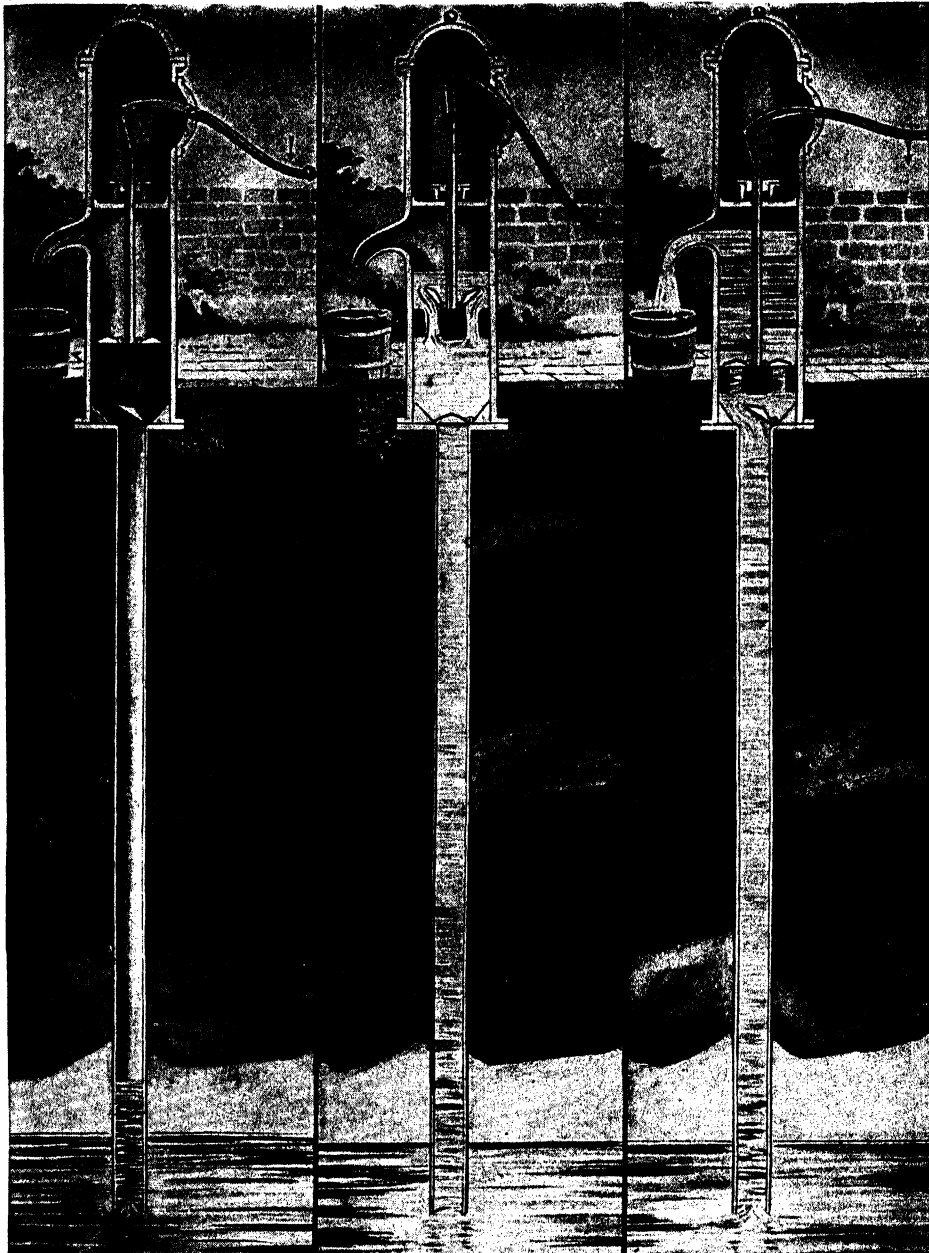
Here, flowing brightly from the tap, is the water which has made its long journey overground and underground, from mountain lake to the kitchen of our house, where a boy's fingers at the tap may control it at last.



There are, of course, many other ways of getting water, and in country villages, where it would be too expensive for the people to have a reservoir, they have to be content with sinking a well into the ground and letting down their buckets by a winding chain, as seen here, and drawing them up again full of water.

The photographs on these pages are supplied by Messrs. Piggott & Sons, Birmingham, W. H. Knowles, and Valentine.

HOW THE WATER COMES OUT OF THE PUMP



A pump brings the water out of a well in the same way as a boy brings water out of a glass by sucking a straw. The first picture shows the handle of the pump ready to be pressed down. When the handle is pressed the piston at the other end of it comes up, as shown by the arrow—which is put in each picture to show the way the handle moves. Underneath the pump is a pipe, reaching down into a well of water, and as the piston rises at the top the air in this pipe is sucked up and the water rushes up the pipe after it. The air rushing up the pipe opens a little valve at the top, through which the water follows it. The water has now reached the top of the pipe and rushes into the bottom of the pump, as in the second picture, and by moving the handle up and down the piston is pressed into the water and the two little valves in the piston are forced open. As the piston goes deeper into the water, the water rises through the open valves until it runs out of the spout. When the pump is still the water is kept down by the pressure of air in the pipe, and the effect of pumping is to draw air out of the pipe so that the water rushes to get out.

THE NEXT PICTURES OF FAMILIAR THINGS BEGIN ON PAGE 2253.

EUGENE ARAM GOES TO HIS DOOM



Two stern-faced men set out from Lynn,
Through the cold and heavy mist ;
And Eugene Aram walked between
With gyves upon his wrist.

The Book of POETRY

A DRAMATIC POEM BY THOMAS HOOD

IN the year 1745 a Yorkshire schoolmaster named Eugene Aram killed a man to gain his goods. He was tried for murder, but was not convicted. Fourteen years later the body of his victim was found, and he was tried again and condemned to death. Aram was a very clever man, a fine scholar, and not at all the kind of person one would suspect of so terrible a crime. The story of his dream is fiction; but in this great poem by Thomas Hood we see how consciousness of guilt may work upon the human mind and become the very agent of justice.

THE DREAM OF EUGENE ARAM

TWAS in the prime
of summer time,
An evening calm and
cool,

And four-and-twenty happy boys
Came bounding out of school :
There were some that ran, and
some that leapt,
Like troutlets in a pool.

Away they sped with gamesome minds,
And souls untouched by sin ;
To a level mead they came, and there
They drave the wickets in :
Pleasantly shone the setting sun
Over the town of Lynn.

Like sportive deer they coursed about,
And shouted as they ran—
Turning to mirth all things of earth,
As only boyhood can :
But the usher sat remote from all,
A melancholy man !

His hat was off, his vest apart,
To catch heaven's blessed breeze ;
For a burning thought was in his brow,
And his bosom ill at ease :
So he leaned his head on his hands, and
read
The book between his knees !

Leaf after leaf he turned it o'er,
Nor ever glanced aside ;
For the peace of his soul he read that
book
In the golden eventide ;
Much study had made him very lean,
And pale, and leaden-eyed.

At last he shut the ponderous tome ;
With a fast and fervent grasp
He strained the dusky covers close,
And fixed the brazen hasp :
“ O God, could I so close my mind,
And clasp it with a clasp ! ”

Then leaping on his feet upright,
Some moody turns he took ;
Now up the mead, then down the mead,
And past a shady nook :
And lo ! he saw a little boy
That pored upon a book !

“ My gentle lad, what is't you read—
Romance or fairy fable ?
Or is it some historic page,
Of kings and crowns unstable ? ”
The young boy gave an upward glance—
“ It is the death of Abel.”

CONTINUED FROM 2024

The usher took six hasty
strides,
As smit with sudden
pain ;

Six hasty strides beyond the
place,
Then slowly back again :
And down he sat beside the lad,
And talked with him of Cain.

And, long since then, of bloody men,
Whose deeds tradition saves ;
Of lonely folk cut off unseen,
And hid in sudden graves ;
Of horrid stabs, in groves forlorn,
And murders done in caves.

And how the sprites of injured men
Shriek upward from the sod—
Ay, how the ghostly hand will point
To show the burial clod ;
And unknown facts of guilty acts
Are seen in dreams from God !

He told how murderers walked the earth
Beneath the curse of Can—
With crimson clouds before their eyes,
And flames about their brain :
For blood has left upon their souls
Its everlasting stain !

“ And well,” quoth he, “ I know for
truth,
Their pangs must be extreme—
Woe, woe, unutterable woe—
Who spill life's sacred stream !
For why ? Methought last night I
wrought
A murder in a dream !

“ One that had never done me wrong—
A feeble man, and old ;
I led him to a lonely field,
The moon shone clear and cold :
Now here, said I, this man shall die,
And I will have his gold !

“ Two sudden blows with a ragged stick,
And one with a heavy stone,
One hurried gash with a hasty knife—
And then the deed was done :
There was nothing lying at my foot
But lifeless flesh and bone !

“ Nothing but lifeless flesh and bone,
That could not do me ill ;
And yet I feared him all the more,
For lying there so still :
There was a manhood in his look
That murder could not kill !

" And lo ! the universal air
Seemed lit with ghastly flame—
Ten thousand thousand dreadful eyes
Were looking down in blame :
I took the dead man by the hand,
And called upon his name.

" Oh, God ! it made me quake to see
Such scenes within the slain !
But when I touched the lifeless clay,
The blood gushed out amain !
For every clot, a burning spot
Was scorching in my brain !

" My head was like an ardent coal,
My heart as solid ice ;
My wretched, wretched soul, I knew,
Was at the devil's price :
A dozen times I groaned, the dead
Had never groaned but twice ;

" And now from forth the frowning sky,
From the heaven's topmost height,
I heard a voice—the awful voice,
Of the blood-avenging Sprite :
'Thou guilty man ! take up thy dead,
And hide it from my sight.'

" I took the dreary body up,
And cast it in a stream—
A sluggish water black as ink,
The depth was so extreme.
My gentle boy, remember this
Is nothing but a dream !

" Down went the corpse with a hollow
plunge,
And vanished in the pool ;
Anon I cleansed my bloody hands,
And washed my forehead cool,
And sat among the urchins young
That evening in the school !

" Oh, Heaven ! to think of their white
souls,
And mine so black and grim !
I could not share in childish prayer,
Nor join in evening hymn :
Like a devil of the pit I seemed,
'Mid holy cherubim !

" And peace went with them one and all,
And each calm pillow spread,
But guilt was my grim chamberlain
That lighted me to bed,
And drew my midnight curtains round,
With fingers bloody red !

" All night I lay in agony,
In anguish dark and deep ;
My fevered eyes I dare not close,
But stared aghast at sleep ;
For sin had rendered unto her
The keys of hell to keep !

" All night I lay in agony,
From weary chime to chime,
With one besetting horrid hint,
That racked me all the time—
A mighty yearning like the first
Fierce impulse unto crime !

" One stern, tyrannic thought, that made
All other thoughts its slave ;
Stronger and stronger every pulse
Did that temptation crave—
Still urging me to go and see
The dead man in his grave !

" Heavily I rose up—as soon
As light was in the sky—
And sought the black accursed pool
With a wild misgiving eye ;
And I saw the dead in the river bed,
For the faithless stream was dry !

" Merrily rose the lark, and shook
The dewdrop from its wing ;
But I never marked its morning flight,
I never heard it sing :
For I was stooping once again
Under the horrid thing.

" With breathless speed, like a soul in
chase,
I took him up and ran—
There was no time to dig a grave
Before the day began ;
In a lonesome wood, with heaps of
leaves,
I hid the murdered man ;

" And all that day I read in school,
But my thought was other-where !
As soon as the midday task was done
In secret I was there ;
And a mighty wind had swept the leaves,
And still the corse was bare !

" Then down I cast me on my face,
And first began to weep,
For I knew my secret then was one
That earth refused to keep ;
Or land or sea, though he should be
Ten thousand fathoms deep !

" So wills the fierce avenging Sprite,
Till blood for blood atones !
Ay, though he's buried in a cave,
And trodden down with stones,
And years have rotted off his flesh—
The world shall see his bones !

" Oh, God, that horrid, horrid dream
Besets me now awake !
Again—again, with a dizzy brain
The human life I take ;
And my red right hand grows raging hot,
Like Cranmer's at the stake.

" And still no peace for the restless clay
Will wave or mould allow.
The horrid thing pursues my soul—
It stands before me now !"
The fearful boy looked up, and saw
Huge drops upon his brow !

That very night, while gentle sleep
The urchin's eyelids kissed,
Two stern-faced men set out from Lynn,
Through the cold and heavy mist ;
And Eugene Aram walked between
With gyves upon his wrist.

FAIR DAFFODILS

Robert Herrick, the writer of this charming song about the daffodils, was a clergyman who lived from 1591 to 1634, and wrote an immense amount of poetry, many of his poems taking rank among the most beautiful in our language.

FAIR daffodils, we weep to see
You haste away so soon ;
As yet the early-rising sun
Has not attain'd his noon.
Stay, stay,
Until the hasting day
Has run
But to the even-song ;
And, having pray'd together, we
Will go with you along.

We have short time to stay as you,
We have as short a spring ;
As quick a growth to meet decay
As you, or any thing.
We die,
As your hours do, and dry
Away
Like to the Summer's rain ;
Or as the pearls of morning's dew,
Ne'er to be found again.

THE INCHCAPE ROCK

This fine poem by Robert Southey describes with great dramatic effect an old story of the east coast of Scotland which may possibly have been true. The Inchcape Rock, from which Ralph the Rover is supposed to have cut the bell, stands twelve miles out from the coast of Scotland. The poem is, of course, intended to show that an evil deed will recoil on the head of the offender.

NO stir in the air, no stir in the sea,
The ship was as still as she could be ;
Her sails from heaven received no motion,
Her keel was steady in the ocean.

Without either sign or sound of their shock
The waves flow'd over the Inchcape Rock ;
So little they rose, so little they fell,
They did not move the Inchcape Bell.

The good old Abbot of Aberbrothok
Had placed that bell on the Inchcape Rock ;
On a buoy in the storm it floated and swung,
And over the waves its warning rung.

When the rock was hid by the surges' swell,
The Mariners heard the warning bell ;
And then they knew the perilous Rock,
And blest the Abbot of Aberbrothok.

The sun in heaven was shining gay,
All things were joyful on that day ;
The sea-birds scream'd as they wheel'd
round,
And there was joyance in their sound.

The buoy of the Inchcape Bell was seen
A darker speck on the ocean green ;
Sir Ralph the Rover walk'd his deck,
And he fixed his eye on the darker speck.

He felt the cheering power of spring,
It made him whistle, it made him sing ;
His heart was mirthful to excess,
But the Rover's mirth was wickedness.

His eye was on the Inchcape float ;
Quoth he, " My men, put out the boat,
And row me to the Inchcape Rock
And I'll plague the priest of Aberbrothok."

The boat is lower'd, the boatmen row,
And to the Inchcape Rock they go ;
Sir Ralph bent over from the boat,
And he cut the bell from the Inchcape float.

Down sunk the bell, with a gurgling sound,
The bubbles rose and burst around ;
Quoth Sir Ralph, " The next who comes to
the Rock
Won't bless the Abbot of Aberbrothok."

Sir Ralph the Rover sail'd away,
He scour'd the seas for many a day ;
And now grown rich with plunder'd store,
He steers his course for Scotland's shore.

So thick a haze o'erspreads the sky
They cannot see the sun on high ;
The wind hath blown a gale all day,
At evening it hath died away.

On the deck the Rover takes his stand,
So dark it is they see no land.
Quoth Sir Ralph, " It will be lighter soon,
For there is the dawn of the rising moon."

" Canst hear," said one, " the breakers roar ?
For methinks we should be near the shore ;
Now where we are I cannot tell,
But I wish I could hear the Inchcape Bell."

They hear no sound, the swell is strong ;
Though the wind hath fallen, they drift along,
Till the vessel strikes with a shivering shock :
Cried they, " It is the Inchcape Rock !"

Sir Ralph the Rover tore his hair,
He curst himself in his despair ;
The waves rush in on every side,
The ship is sinking beneath the tide.

But even in his dying fear
One dreadful sound could the Rover hear,
A sound as if with the Inchcape Bell,
The fiends below were ringing his knell.

THE TRAVELER'S RETURN

Robert Southey here describes without exaggeration the purest and most delightful of all the human affections : the joy which comes when we return from a journey to the companionship of those we love beneath the roof of our own home.

SWEET to the morning traveler
The song amid the sky,
Where, twinkling in the dewy light,
The skylark soars on high.

And cheering to the traveler
The gales that round him play,
When faint and heavily he drags
Along his noontide way.

And when beneath the unclouded sun
Full wearily toils he,
The flowing water makes to him
A soothing melody.

And when the evening light decays,
And all is calm around,
There is sweet music to his ear
In the distant sheep-bell's sound.

But O ! of all delightful sounds
Of evening or of morn,
The sweetest is the voice of love
That welcomes his return.

* WISHING

There is wise advice in these verses by Ella Wheeler Wilcox, for it is true that no amount of wishing will avail us anything if our wishes are not followed up by serious endeavor.

Do you wish the world were better ?
Let me tell you what to do :
Set a watch upon your actions,
Keep them always straight and true ;
Rid your mind of selfish motives,
Let your thoughts be clean and high.
You can make a little Eden
Of the sphere you occupy.

Do you wish the world were wiser ?
Well, suppose you make a start
By accumulating wisdom
In the scrapbook of your heart.
Do not waste one page on folly ;
Live to learn, and learn to live.
If you want to give men knowledge,
You must get it, ere you give.

Do you wish the world were happy ?
Then remember day by day
Just to scatter seeds of kindness
As you pass along the way ;
For the pleasures of the many
May be oftentimes traced to one,
As the hand that plants an acorn
Shelters armies from the sun.

THE DOG AND THE WATER-LILY

William Cowper, like most poets, was a great lover of animals, and among the many poems in praise of man's true friend, the dog, this by him deserves a high place.

THE noon was shady, and soft airs
Swept Ouse's silent tide,
When, 'scaped from literary cares,
I wander'd on his side.

My spaniel, prettiest of his race,
And high in pedigree
(Two nymphs adorn'd with every grace
That spaniel found for me),

Now wanton'd lost in flags and reeds,
Now starting into sight,
Pursued the swallow o'er the meads
With scarce a slower flight.

It was the time when Ouse display'd
His lilies newly blown ;
Their beauties I intent survey'd,
And one I wish'd my own.

With cane extended far I sought
To steer it close to land ;
But still the prize, though nearly caught,
Escaped my eager hand.

Beau mark'd my unsuccessful pains
With fix'd considerate face,
And puzzling set his puppy brains
To comprehend the case.

But with a cherup clear and strong
Dispersing all his dream,
I thence withdrew, and follow'd long
The windings of the stream.

My ramble ended, I return'd ;
Beau, trotting far before,
The floating wreath again discern'd,
And plunging left the shore.

* From " Poems of Power," copyright, 1908, by Ella Wheeler Wilcox. By special permission of the publishers, W. B. Conkey Company, Hammond, Ind.

I saw him with that lily cropp'd
Impatient swim to meet
My quick approach, and soon he dropp'd
The treasure at my feet.

Charm'd with the sight, " The world," I
cried,
" Shall hear of this thy deed ;
My dog shall mortify the pride
Of man's superior breed ;

" But chief myself I will enjoin
Awake at duty's call,
To show a love as prompt as thine
To Him Who gives me all."

THE CHILD AND THE SNAKE

This is one of the many poems for children written by Charles and Mary Lamb, and is most likely the work of the latter, judging by the very simple verse. The story which it tells is believed to have been founded on fact.

HENRY was every morning fed
With a full mess of milk and bread.
One day the boy his breakfast took,
And ate it by a purling brook.
His mother lets him have his way.
With free leave Henry every day
Thither repairs, until she heard
Him talking of a fine *gray bird*.
This pretty bird, he said, indeed,
Came every day with him to feed ;
And it loved him and loved his milk,
And it was smooth and soft like silk.
On the next morn she follows Harry,
And carefully she sees him carry
Through the long grass his 'heap'd-up
mess ;

What was her terror and distress
When she saw the infant take
His bread and milk close to a snake !
Upon the grass he spreads his feast,
And sits down by his frightful guest,
Who had waited for the treat ;
And now they both began to eat.
Fond mother ! shriek not, Oh, beware
The least small noise, Oh, have a care—
The least small noise that may be made
The wily snake will be afraid—
If he hear the slightest sound,
He will inflict th' envenom'd wound.
She speaks not, moves not, scarce does
breathe,

As she stands the trees beneath.
No sound she utters ; and she soon
Sees the child lift up his spoon,
And tap the snake upon the head,
Fearless of harm ; and then he said,
As speaking to familiar mate :
" Keep on your own side, do, Gray
Pate."

The snake then to the other side,
As one rebuk'd, seems to glide ;
And now again advancing nigh,
Again she hears the infant cry,
Tapping the snake : " Keep further, do ;
Mind, Gray Pate, what I say to you."
The danger's o'er ! she sees the boy
(Oh, what a change from fear to joy !)
Rise and bid the snake " Good-bye " ;
Says he, " Our breakfast's done, and I
Will come again to-morrow day "
Then, lightly tripping, ran away.

THE VISION OF BELSHAZZAR

The great poet Lord Byron wrote many fine poems in which he told over again with all the splendid effect of his vigorous and directly moving verse the old stories of the Bible. In the following we have the fifth chapter of the Book of Daniel compressed into six verses of poetry, full of color and dramatic power. It would be helpful to read the chapter of the Bible along with the poem here given.

THE King was on his throne,
The Satraps throng'd the hall;
A thousand bright lamps shone
O'er that high festival.
A thousand cups of gold,
In Judah deem'd divine—
Jehovah's vessels hold
The godless Heathen's wine.

In that same hour and hall
The fingers of a Hand
Came forth against the wall,
And wrote as if on sand:
The fingers of a man—
A solitary hand
Along the letters ran,
And traced them like a wand.

The monarch saw and shook,
And bade no more rejoice;
All bloodless wax'd his look,
And tremulous his voice:
"Let the men of lore appear,
The wisest of the earth,
And expound the words of fear,
Which mar our royal mirth."

Chalda's seers are good,
But here they have no skill;
And the unknown letters stood
Untold and awful still.
And Babel's men of age
Are wise and deep in lore;
But now they were not sage,
They saw—but knew no more.

A captive in the land,
A stranger and a youth,
He heard the King's command,
He saw the writing's truth.
The lamps around were bright,
The prophecy in view;
He read it on that night—
The morrow proved it true!

"Belshazzar's grave is made,
His kingdom pass'd away,
He, in the balance weigh'd,
Is light and worthless clay;
The shroud, his robe of state,
His canopy, the stone;
The Mede is at his gate!
The Persian on his throne!"

TO THE SKYLARK

One of the many poems in which William Wordsworth describes with so much truth and loving observation the characteristics of the wild creatures of our land.

ETHEREAL minstrel! pilgrim of the sky!
Dost thou despise the earth where cares
abound?
Or while the wings aspire, are heart and eye
Both with thy nest upon the dewy ground?
Thy nest which thou canst drop into at will,
Those quivering wings composed, that music
still!

To the last point of vision, and beyond,
Mount, daring warbler! that love-prompted
strain
'Twixt thee and thine a never-failing bond—
Thrills not the less the bosom of the plain:
Yet mightst thou seem, proud privilege! to sing
All independent of the leafy spring.

Leave to the nightingale her shady wood;
A privacy of glorious light is thine,
Whence thou dost pour upon the world a flood
Of harmony, with instinct more divine;
Type of the wise, who soar, but never roam—
True to the kindred points of Heaven and
home.

EPITAPH ON A HARE

How fortunate was the lot of this hare which came into the gentle keeping of the poet William Cowper compared with the fate of so many of its race! Still, it would not be possible for all the members of the great hare family to lead such pleasant lives as the poet's pet; and while such tender sentiment as Cowper awakens in us by poems like this is of incalculable value in softening our character, we must not let it carry us into false views of the wild life of Nature.

HERE lies whom hound did ne'er pursue,
Nor swifter greyhound follow,
Whose foot ne'er tainted morning dew,
Nor ear heard huntsman's hallo!

Old Tiney, surliest of his kind,
Who, nurs'd with tender care,
And to domestic bounds confined,
Was still a wild Jack-hare.

Though duly from my hand he took
His pittance every night,
He did it with a jealous look,
And, when he could, would bite.

His diet was of wheaten bread,
And milk, and oats, and straw;
Thistles, or lettuces instead,
With sand to scour his maw.

On twigs of hawthorn he regaled,
On pippin's russet peel,
And when his juicy salads failed,
Sliced carrot pleased him well.

A Turkey carpet was his lawn,
Whereon he loved to bound,
To skip and gambol like a fawn,
And swing himself around.

His frisking was at evening hours,
For then he lost his fear,
But most before approaching showers,
Or when a storm drew near.

Eight years and five round rolling moons
He thus saw steal away,
Dozing out all his idle noons,
And every night at play.

I kept him for his humours' sake,
For he would oft beguile
My heart of thoughts that made it ache,
And force me to a smile.

But now, beneath this walnut shade,
He finds his long last home,
And waits, in snug concealment laid,
Till gentler Puss shall come.

He, still more aged, feels the shocks
From which no care can save,
And, partner once of Tiney's box,
Must soon partake his grave.

LITTLE VERSES FOR VERY LITTLE PEOPLE

OLD Abram Brown is dead and gone,
You'll never see him more ;
He used to wear a long brown coat,
That button'd down before.

YOU shall have an apple,
You shall have a plum ;
You shall have a rattle-basket,
When your dad comes home.

I'LL sing you a song,
Though not very long,
Yet I think it as pretty as
any.
Put your hand in your purse,
You'll never be worse,
And give the poor singer a
penny.



THE cock doth crow,
To let you know,
If you be wise,
'Tis time to rise.

THE man in the moon
Came tumbling down,
And asked his way to
Norwich ;
He went by the south,
And burnt his mouth,
With supping cold pease-porridge.

IF ifs and ans
Were pots and pans;
There would be no need for tinkers !

DANCE A BABY

Dance a ba - by did-dy..... What can mam-my do wid 'e?.....

Sit in a lap, Give it some pap, And dance a ba - by did-dy.....

MY little old man and I fell out ;
I'll tell you what 'twas all about :
I had money and he had none,
And that's the way the noise begun.

THE King of France went up the hill,
With twenty thousand men ;
The King of France came down the hill,
And ne'er went up again.

THERE was a little boy
and a little girl,
Lived in an alley ;
Says the little boy to the
little girl,
" Shall I, oh, shall I ? "



WHEN little Fred was
called to bed,
He always acted right ;
He kissed Mamma, and then
Papa,
And wished them all good-
night.

Says the little girl to the
little boy,
" What shall we do ? "
Says the little boy to the little girl,
" I will kiss you ! "

He made no noise, like
naughty boys,
But gently he upstairs
Directly went, when he was sent,
And always said his prayers .

ASUNSHINY shower
Won't last half an hour.

AS the days lengthen,
So the storms strengthen.

THINGS TO MAKE AND THINGS TO DO



A BAROMETER A BOY CAN MAKE

THE manufacture of the barometers that we see hanging in the halls of houses and in the windows of the shops where they are sold is beyond the abilities of the schoolboy. But any boy can, by following the instructions on this page, make a barometer that will serve the purpose and will illustrate the principle of the factory-made or shop-made barometers.

The first thing we need is a piece of glass tubing. It should be forty-two inches long and its inside diameter should be a quarter of an inch, so that outside it should be three-eighths of an inch in diameter or a little more. There is more than one kind of glass tubing, and we must get the kind that is best for the purpose. There is an ordinary kind which we should not use, and there is a kind which, when looked at sideways, has a greenish appearance. This greenish kind is the best for the purpose. We might as well know the reason why the greenish glass is better. The pure, transparent glass owes its transparency to a substance called lead oxide. If we fill such a tube with mercury, the mercury draws out the lead oxide from the glass and forms a substance that sticks to the inside of the tube and prevents the mercury moving up and down.

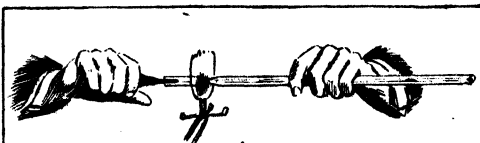
The first thing we do with our glass tube is to wash it in warm water. Pour the

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of the string and pull the cloth right through the tube with the string. After the tube is clean we must dry it. We do this by tying to a piece of string a piece of clean, soft linen cloth, such as a piece of an old handkerchief, then putting the other end of the

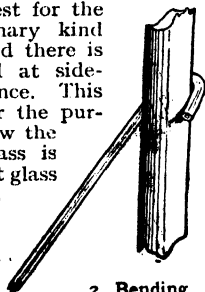
string through the tube and pulling the cloth right through. This may be done a few times to get the tube quite dry.

Now we take the tube and put it into a gas-flame, letting the flame heat it

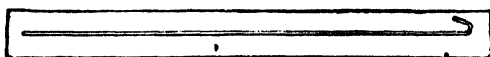


1. Closing the end of the barometer tube.

about two inches from one end as shown in picture 1. This end we had better hold with a pair of pliers. The best kind of pliers for the purpose is that with round ends, or "noses," as they are called. The end should be thin enough to go inside the tube. When we find that the gas-flame has softened the tube at the place where it has been, we pull the two ends of the tube apart, gently turning it round a little as we do so. We find that we pull the tube into two pieces and that each end has a long tail. We can throw away the small piece of tube, but we have not yet finished with the long piece. We must get rid of the long, thin end, and at the same time leave the tube closed at the end instead of open as formerly. Therefore we again heat the end of the tube, turning it round as we do so, and, with the help of the pliers or any convenient metal instrument, tap the end until we make a neat end as nearly round



2. Bending the tube.



3. Position of tube on the frame.



4. The tube ready for the mercury.

warm water through it until it is quite clean. If it is very dirty and this is not sufficient to clean it, it may be necessary to put a string through the tube, and then to tie a piece of cloth to one end

as possible and without the long, thin part. This part of the work requires a little care, as we must not burn our hands or clothes, but we shall find that it is not at all difficult to do.

THINGS TO MAKE AND THINGS TO DO

We will suppose that we have now got the tube with one end closed and rounded. The next thing to do is to make a bend near the other end. This bend must be a gradual curve just as if the tube were bent round a wheel one and a quarter inches in diameter. In fact we may use a piece of wood or metal of this diameter to assist us in making the bend as seen in picture 2. We measure the tube thirty-six inches from the end that we have sealed up, and heat it in the gas-flame at this place. As it becomes a little soft, but not quite so soft as we made the other end, we bend it round a little, then heat it again and bend it again until we have the lower or short end almost, but not quite, parallel with the long part of the tube.

The tube is now made, and we can now make the wood back upon which we will mount the tube. Get a piece of wood forty inches long, four inches wide, and about half an inch thick. Now get another piece of wood the same size, but only a quarter of an inch thick. Plane the wood all round until it is nice and smooth. Now lay the glass tube upon the thinner piece of wood in the position shown in picture 3 and mark round it carefully with a pencil. Cut out with a chisel the wood we have marked, and then nail the thin piece of wood to the thicker piece, taking care to keep the edges in line. We now have a board with a recess that fits the tube, and in which the tube may be fixed when we have filled it with mercury.

The next part of our work is to fill the tube with mercury. The mercury should be as nearly pure as possible. We can easily tell if it is pure by pouring a little of it on a clean plate and moving the plate, so that the mercury runs about. If it breaks up into small round drops which run together readily and leave no stain on the plate, the mercury is pure and may be used. If, however, the drops into which the mercury breaks up are not round, but pear-shaped, running into each other with difficulty, or if they leave a stain on the plate, the mercury is not pure and should not be used.

Even if the mercury is pure we should strain it so as to take out any solid foreign matter that may be mixed with it. Take a glass tumbler and a piece of chamois leather. Pierce the leather with small pinholes and then place it over the mouth of the tumbler, pressing it down in the middle. Pour the mercury on to the leather; it will run through the pinholes into the tumbler, leaving any foreign matter on the leather.

Now we have to fill the tube with the mercury. The tube should be laid flat with the lower end upwards, and supported in this position by something such as a book, as seen in picture 4. We can see the reason why we did not bend over the lower end to be exactly parallel with the main stem; if we had done so, it would

have been more difficult to pour in the mercury.

We shall want a little filler to enable us to pour in the mercury. We can easily make this filler with a piece of paper. Take a half-sheet of notepaper that is very stiff. Fold it over into a cone-shape with a tiny hole at the top of the cone. The hole should be small enough to enable the end to go into the tube a little way. With gum or paste fix the edges of the filler so that it will not come apart in use. In pouring in the mercury, prop up the short end of the tube as seen in picture 4, with the left hand hold the filler with its nose in the tube, and pour the mercury in a thin stream into the filler. Do this until the mercury is within one inch of the open mouth of the tube. At intervals during the process agitate the tube a little; this will make any air-bubbles escape.

Place a cup or a saucer on the table and lift the tube erect over it. The mercury will overflow through the lower end of the tube and the cup or saucer will catch it. Then put the end of a penholder or any other round piece of wood into the tube a little way, so as to make the mercury overflow more until about one and a half inches from the top of the tube are empty.

The tube may now be placed in the wooden frame we prepared for it, and we must put over the front of the tube, in about three places, clips to keep it in place. We could have these clips of brass or tin, but we can make wooden clips more easily. They should be made the whole width of the frame. Picture 5 shows one of the clips, and picture 6 shows part of the board with one clip in position. We must be careful not to split the wood when we nail them on. The holes through which the nails are put should be made with a small brad-awl if we would avoid splitting the wood.

The only thing to do now is to mark the inches on the frame by the side of the tube. Take a piece of card, four inches long and one and a half inches wide. Cut it neatly square and mark it like picture 7. The distance between 29 and 30 is one inch, and from 30 to 31 it is one inch. Take another card the same size and mark it with wording as in picture 8.

We have now to attach these cards to the frame at the side of the tube. Look at another barometer that is in good working order. The dial is marked in inches. To whatever mark the dial hand points, fix the card to the frame with that mark opposite the level of the mercury near the top of the tube. Put the other card on the opposite side of the tube, as seen in picture 9, and the barometer may be considered complete. But it will improve the appearance and keep dust from the tube if we put a glass front on it. This may be done by making and nailing to the edges of the top, bottom, and sides of the frame suitable pieces to hold the glass.



5. Wooden clip.



6. Clip in position.

— 31
— 30½
— 30
— 29½
— 29
— 28½
— 28

7. Figuring.

VERY DRY
SETTLED FAIR
FAIR
CHANGEABLE
RAIN
MUCH RAIN
STORMY

8. Wording.



9.

Completed barometer

A DOLL'S CHRISTMAS HAMPER

WHILE we are enjoying the good things that Christmas brings, we surely must not forget our dolls. Here we are going to learn how to make a little doll's hamper, and later on to fill it with Christmas "goodies" which we shall find it quite easy to model with our fingers out of clay.

First, then, we will make the hamper, for which we must carefully measure off seven pieces of "No. 4" (or fairly thick) cane. Most of the big toy-shops sell cane for cane-weaving, or, of course, it can be bought from any basket factory.

If we make the hamper three inches high, each piece of cane must be sixteen inches long. These seven lengths of cane are for the foundation of our hamper, and we will call them the "spokes" whenever we refer to them, as they remind us of the spokes of a wheel.

Form a cross with four spokes across and three spokes upright, the three upright spokes being in front as in picture 1.

Hold these between the thumb and first finger of the left hand.

Our next step is to select a long piece of "No. 1" (or fine) cane, which we shall call the "weaving-cane," as it weaves in and out the spokes, just as the threads of any woven material pass over and under each other.

We must hold the weaving-cane in our right hand, a few inches from one end. Place this end of the weaving-cane at the dot in picture 1, and pass it under the four spokes at A, over the three spokes at B, under at C, and again over at D. We draw this as tightly as possible and pass the cane under the tiny end to form a tie.

of the picture where we see two spokes taken together. Some of us may think this a mistake, but in weaving we must have an odd number of spokes, because where the weaving-cane passes over one time, the next time it must go under.

At the place marked X in picture 2, we take two spokes together and treat them just as one spoke.

By taking the two together it fastens the odd number in quite securely. Continue the weaving over and under, taking care, when you come to the spoke with the little bit beside it, that you treat that spoke and the little bit as one. We must remember always to weave in the direction in which we began.

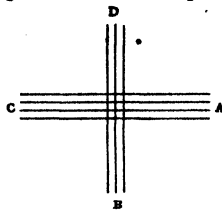
If we have done our weaving correctly, the weaving-cane will now pass under the spoke over which it went the last time round.

We must continue our weaving until we have covered about one inch from the centre of the basket. Then cut off one of the two spokes taken together and what is left of the tiny bit of weaving-cane where we started.

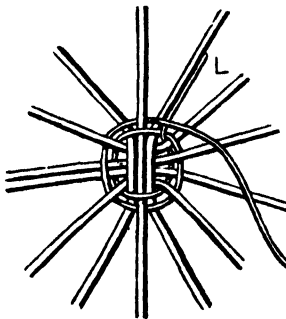
One very important thing which it will be well for us to make a note of just here is the right way to hold our work. Hold the work in the left hand perpendicularly, the weaving-cane being held in the right hand just like a skipping-rope about two inches away from the basket. We now slip the first finger out and hold the cane between the thumb and

the second finger.

Don't think Mr. First Finger has nothing to do. He is a very important person, and acts as a guide to Mr. Weaving-cane, guiding and pressing him always into his proper place.



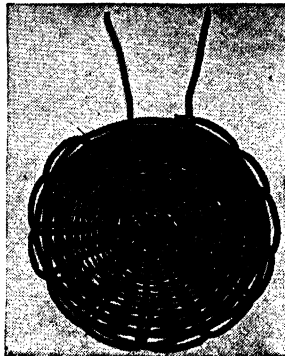
1. Position of the canes.



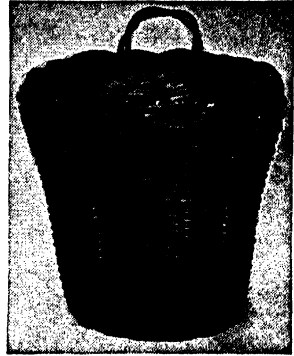
2. Beginning to make the basket.



3. The basket without the lid.



4. The lid of the basket.



5. The basket complete.

In picture 2 we are able to see just how the weaving-cane travels, if we follow it up from the letter L.

From this point we weave over one spoke and under the next until we have passed eight spokes, which brings us to the left side

We must also be very careful never to pull the weaving-cane, but to bend it round the spokes, moving the basket up and down at the same time.

Every touch of our fingers has a permanent effect on the ultimate shape of our

basket, and no subsequent pressure will alter it. We shall be able to begin a second basket much better after we have thus learned to weave properly.

Basket-weaving is most fascinating work when once we have acquired the art of weaving easily; therefore it is worth while to practise weaving, as from this small beginning it is possible to make any number of very pretty and useful articles.

How are we to turn up the cane for the sides of the hamper?

We notice the alternate spokes are on the top of the weaving-cane. These spokes we bend away from us. Weave round once again, when, of course, the other spokes are on the top. These also must be bent away from us. We must continue weaving as before, taking care to keep the spokes nearly at right angles to the bottom of the basket.

We must remember, as we weave the side of the hamper, when the weaving-cane is going behind a spoke, to draw that spoke back with the guiding finger and slip the whole hand behind it to put the weaving-cane in place. The more we press on the spokes when drawing them back, the more the sides of our basket will slant outwards.

By this time the side of our hamper measures two and a half inches from where we turned it up. Here we take a length of No. 4, or

rather thick, cane to weave the other half-inch. An important point to learn just now is how to join a new piece of cane.

"We must always finish off the end of the old weaving-cane, when we have come under a spoke, by pushing the loose end of the weaving-cane down the side nearest to us of the same spoke. Take a new piece of weaving-cane and pass the end down the far side of this spoke. Both the old and the new weaving-cane pass behind the same spoke, but the join does not show at all on the right side of the basket.

To finish our basket we cut an inch off each spoke with the exception of two, which we leave to form the handle, as seen in picture 3. Each spoke must be turned back the opposite way from which we have been weaving, and pressed down the far side of the next spoke until it lies level with the last line of weaving. To form the little handle, we cross the two spokes and push the ends down so that one end goes in where the other starts from.

Having made our hamper, we may now start the lid for it, which is made exactly as the bottom of the hamper, using seven spokes about six inches long.

When the weaving exactly fits the top of our hamper, we finish by pushing the spoke-ends down the sides of their left-door neighbours.

THE MAGIC TUMBLER

THE magic tumbler is a conjuring trick that requires little preparation and no expense, unless the conjurer is clumsy enough to break the tumbler as he tries to perform the feat. The trick consists in taking a tumbler, covering it with paper, placing it on the table, and, with one push of the hand, passing it through tablecloth and table on to the other hand, held beneath the table. At least, this is what seems to be

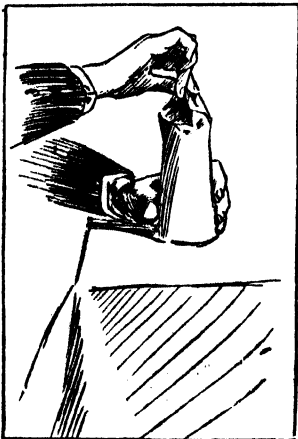
done, and that is what counts in a trick.

The young conjurer seats himself at a table having a tablecloth on it, with his audience on the far side of the table opposite him. He has an ordinary tumbler and a piece of paper a little larger than the page of this book. If the paper is tinted, so much the better, it will help the deception, and

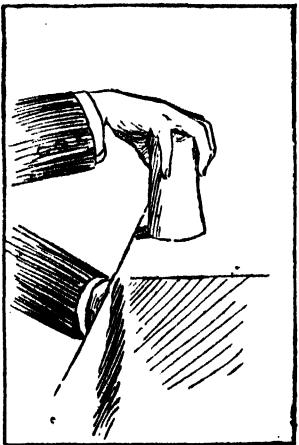
substance without breaking. I merely wrap it in this paper"—here you fold the paper round it, as seen in picture 1, taking care that it is rather loose at the mouth end of the tumbler—"then I place it upside down on the table like this"—at this point you hold the tumbler by the right hand over the paper, as seen in picture 2, but in doing so allow it to slip out into your left hand, held on your knee.

Now you put your left hand under the table with the tumbler in it, but take care not to let it knock against the wood of the under side of the table, as this would disclose the trick. You have your hand on top of the paper that is supposed to have the tumbler inside it.

"Magic tumbler," you say, "Hong - Kong, Canton, Manchu, go!"—any other nonsensical phrase will do—and you press sharply upon the top of the paper, squeezing it right down to the table. Then you produce the tumbler from beneath the table with your left hand.



1. Folding up the tumbler.



2. The tumbler about to pass.

it should be rather stiff.

The tumbler may be passed round for inspection. "This tumbler," you say, "is made of Chinese glass, and it has the marvellous property of passing through any solid

A TABLE-SQUARE IN RIBBON-WORK

A TABLE-SQUARE is a useful Christmas present, and if embroidered with dainty ribbon-work it can be quickly and easily made. Suppose we choose to make one for a present, and have never tried to do ribbon-work before. This is the way we should set about it. We want material that is easy to work upon, and at the same time inexpensive; also a simple but pretty design. For the first, it is cheaper to buy half a yard of fine canvas, at from 9 cents to 20 cents the half yard, according to the quality and width. As the canvas is usually very wide—that used in the picture measured 44 inches—two or three articles can be made from it besides the table-square.

We will cut our table-square 18 inches by 18 inches that is just half a yard square. Next we draw with a lead pencil the outline of the shape shown in the picture. The middle points of the half-circles are found by folding the canvas in halves, just one way and then the other, but not so as to crease the canvas. We must be sure to get the pointed corners opposite each other. The material may, of course, be left square, but it looks better shaped.

Now for the design. If you can do it, draw your own from a real spray of flowers; failing that, get a ready-made transfer that will cost from ten to fifty cents; place it, shiny side downwards, on the canvas, and press the paper with a hot iron until the design is well impressed.

The flower chosen here is the jasmine worked in yellow, and it is repeated in each of the four corners. We choose it because of its simplicity.

Three kinds of silk ribbon are used for ribbon-work. The narrowest is the Pompadour or China ribbon (also called "baby ribbon"), about an eighth of an inch in width. A wider kind is the giant ribbon—it is gigantic only compared with the narrow kind—and a third is the rainbow ribbon, which, as its name tells, is shaded or variegated.

We will choose for our first attempt the narrow yellow "baby" ribbon at two cents. Four yards will be ample for the four sprays of jasmine. About half a yard of green ribbon is wanted for the leaves of each jasmine spray; but the quantity will depend on the skill which we use in passing from one leaflet to another. Wasteful people put as much ribbon on the back as on the front.

We shall also want a 8 cent ball of green rope silk for the stems, a fairly blunt, short,

large-eyed needle, and a little yellow sateen to line the square.

An ordinary darning-needle or crewel needle will serve the purpose, or a rug needle if one is at hand. We must see that the point is not very sharp, and watch that it does not

pierce the ribbon anywhere.

In taking a needleful of the yellow ribbon for the blossoms, it is a mistake to cut a long piece, for the ribbon so easily twists, and tends to get stringy when passed often in and out of the holes in the canvas. So we take a rather short needleful, knot it at one end, and pass the needle from the back to the front of the canvas at the centre of one flower. We put the needle through

the end of the petal, or rather, as a botanist would say, the leaf of the corolla, and while drawing the ribbon through after it, place the left thumb under or over the ribbon to make it lie untwisted. Bring the needle out again through the adjoining lower hole of the canvas, and form the other half of the petal.

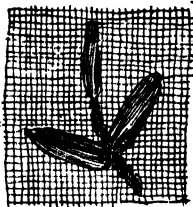
Of course, the stitch might be taken from the centre of the flower again, but that would waste the ribbon on the back of the canvas. Then make the other petals and the tube of the corolla. A stitch taken sideways forms the centre of the flower, or French knots may be made here, preferably in a darker shade. Two long stitches of green ribbon form the two halves of the leaf. The edges of the two stitches suggest the midrib. To fasten off the ribbon, we draw it through several of the stitches in the back. The ribbon *must* lie untwisted and even on the front of the canvas. This is the secret of successful ribbon-work.

We shall be surprised to find how quickly a leaf can be made. The stems are stitched with rope silk in long and then short slanting stitches taken downward from the top to the bottom of the stem.

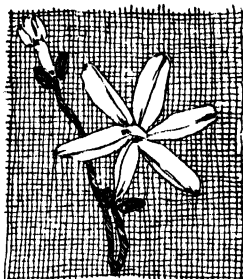
When all the sprays are worked, stitch the sateen lining on to the back of the canvas. If the canvas has been crumpled at all in working, it may be pressed flat with an iron. A pretty edging may be added to the table-square by making a

frill of some of the variegated green ribbon at 5 cents a yard. We draw up the thread which can be found along one side of it, and sew the ribbon round the edge of the canvas.

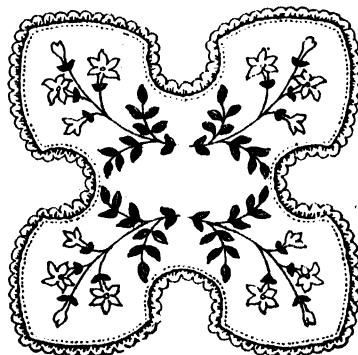
Ribbon-work is suitable for glove and handkerchief sachets, nightdress-cases, table-centres, fancy bags, doilies, cushion-covers, tea-cosies and dress trimmings.



The leaf.



The flower.



The table-square ornamented by ribbon-work.

A LITTLE GARDEN MONTH BY MONTH

WHAT TO DO IN THE MIDDLE OF DECEMBER

WHAT we do at this time of year depends entirely upon the weather. If it be fine and open, and we especially wish to make a new pathway, we may do so. There are a few things we ought to remember in making this, and one is to make it rather higher towards the centre than at the edges, as the water drains away better and gives us a much drier and pleasanter path to walk upon in wet weather.

It will be better to do no more planting in our gardens, because even if it is not actually frosty at the time of planting, probably it will be before the roots of the plants could become settled in the soil, and this might cause them to decay and die. Yet if we may not plant we must still not neglect our gardens. Suppose we have put in two or three new rose-trees, and perhaps some rose-cuttings, which are so charming to grow, as they make what is called "roses on their own roots," and there is never the fear of suckers, which are often extremely troublesome.

Now we will suppose a spell of frost comes, and after that, naturally, a thaw. The ground becomes quite soft and loose, and those newly-planted subjects—whether roses or anything else, for that matter—that are not firmly established in the soil, become loosened with the soil, and lose the little grip they had obtained of it. This is the one thing to fear, for if it happens and is not remedied, without a doubt the plants will die. But, happily, it is a state of things quite easy to remedy; it simply means treading or otherwise making the soil firm and close about the plants, as it was before the frost acted upon it.

Though the action of the frost on the soil may be a source of danger to newly-planted trees and cuttings, we must bear in mind that, apart from this, the frost does a great deal to sweeten the soil, and makes it in excellent condition; and for this reason any bit of the ground that is not occupied by plants should be dug up so that the frost may penetrate and do the utmost good possible.

How does a gardener regard a heavy fall of snow over his many plants? As Nature's wisest and best protection from the bitter winds and frosts. No wind can hurt our plants when they are safely under their snow blanket. But often the winter winds and frosts are keen and biting when there is no snow upon the ground. This is the hardest trial our plants have to bear, and it may be necessary to afford protection to a few that are not quite hardy in our winter climate.

If we are able to gather a few armfuls of fresh straw, we may put it round such plants as the rhododendron, and even round about a rose-tree if of a more than usually tender nature, and anything else for which we have reason to fear. If some of these rather tender subjects die down completely, and are below ground for the winter, we may cover the earth above them with dry leaves or with ashes. Either of these is very helpful in keeping the frost from reaching them.

It is necessary to pay frequent attention to violets at all times if they be growing in frames, and we have undertaken the care of them.

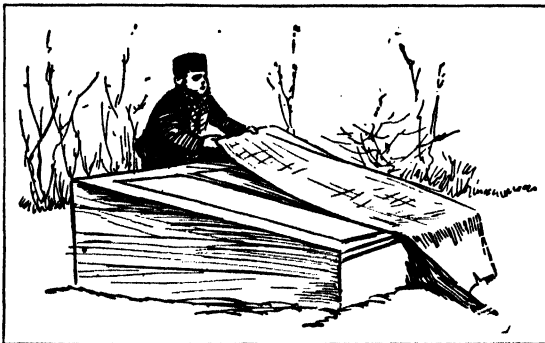
Never coddle violets; they are hardy, brave little plants, and they strongly object to being treated as if they were tender and fragile. If they could speak, how often they would plead for air, air, air, more air! You ought to have gathered many pretty blooms by this time even from a 6 by 4 foot frame, and have the

prospect of gathering a fine bunch on Christmas morning, though the time the plants flower will, to a certain extent, depend upon the variety which is being grown. Very little water—generally none at all—is needed for weeks together at this season, but unless the thermometer shows that it is freezing, or there is a sharp wind, raise the lights dur-

ing the warmest portion of the day. Even at night, unless very cold, the lights need not be quite close down, but the opening can be covered with a bit of sacking, and in this way there will be a slight amount of ventilation.

You will think, perhaps, that great importance is being laid on giving them sufficient air. But there is nothing like it to keep them healthy. Insufficient air generally means that leaves become affected with mildew, and whole plants may "damp off," as it is called. But in really severe weather we must run the risk of that for a short time, and during sharp frosts the lights go down, and mats or anything we can lay hands on may be covered over them, so that Jack Frost shall not touch the pale, sweet flowers. If he does he will leave the mark of his breath upon them, and they will become discolored.

Our pot plants that we are sheltering in the house or in a greenhouse will now need less water than at other seasons when they are growing freely. In the winter a great many of them go almost to rest, at any rate, they are not pushing out new growths unless kept at a high temperature. Never let pot plants stand in a saucer of water.



Protecting tender plants

ELECTRICITY MADE AT HOME

ELECTRICITY is perhaps the most powerful and yet the most mysterious force in the world. Yet the knowledge of it is almost new. It is easy nowadays to push a button or press a knob up or down and so light up a room with electric light. Yet this became possible only during the last half of the last century. When our grandfathers were boys, electric lighting, even in a palace, was quite unknown.

The experiments which made the powers of electricity known go back much further, and it is over 150 years since Benjamin Franklin began to find out something about this mysterious power. Some of the methods he used were very simple, and any boy can try them for himself.

Take a piece of ordinary brown paper, and warm it before the fire. When it is hot, lay it on the table and brush it briskly with a warm and dry clothes brush. You then pick it up quickly and hold it to the wall. You will find that the paper has become electrified, and that it will cling to the wall. It clings because it is *electrified* and is attracting the wall to it. If you warm the paper and brush it as before, and then hold it over some little bits of lighter paper, the small pieces will fly up and cling to the electrified brown paper.

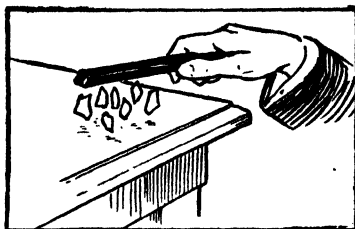
It is even possible to get sparks from electrified paper. Take a large sheet of stout drawing-paper, warm it till it is thoroughly dry, lay it on a dry wooden table, and rub it very briskly with a piece of flannel or woollen material to electrify it. Then put a piece of metal—a watch-chain or a bunch of keys—in the middle and lift the paper off the table by two corners. Then, if someone else puts his knuckle or finger to the metal, a bright spark will pass between his finger and the metal, which, however, he won't feel. If the weather and the paper are thoroughly dry, you may get a spark an inch long.

But paper is not the best thing to try these experiments with. For one reason, it will not retain electricity very long, and for another it is not the most easy substance to electrify.

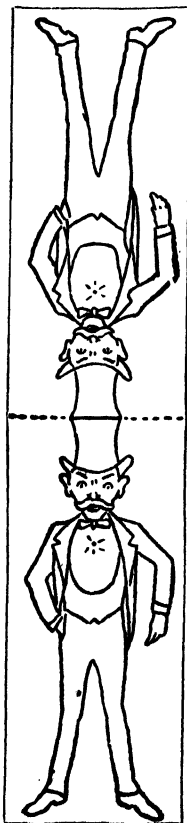
electrify.



3. The drunken man cut out



1. The exciter picking up paper



2. The drunken man

A piece of glass rod or tube is a better *exciter*, as we call anything electrified by rubbing. A solid rod is the better, and a chemist can sell us a piece for a penny. To excite, or electrify, this, we must rub it briskly with a piece of dry silk. Or we can take a stick of ordinary sealing-wax, which must be rubbed with flannel. A third kind of exciter, and a very good one too, is a piece of vulcanite, rubbed with flannel.

Vulcanite is hard rubber, and fountain-pens are generally made of it. So if we can get an old fountain-pen it will do first rate.

We take our glass rod, sealing-wax, or fountain-pen, and excite it by rubbing with the silk or flannel.

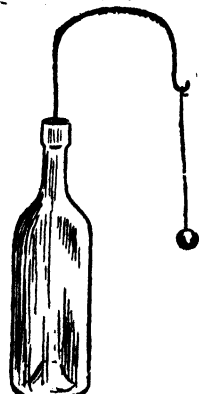
Then we hold it near some tiny scraps of paper or bits of bran, and it will pick them up as seen in picture 1.

We must be careful that everything is quite dry, and the articles must be warmed before the fire to make sure they are dry. All experiments with this kind of electricity will fail most disappointingly unless everything is warm and dry, including the weather. We shall find sometimes that

the rod will pick up the paper, and afterwards will not attract the same piece. This is because the little bit of paper has received a charge of electricity from the rod, and when two electrified bodies come together they repel one another, if both are electrified with the same sort of electricity.

If the bodies are charged with opposite kinds of electricity they will attract one another. These two sorts of electricity are called *positive* and *negative* electricity. Glass rubbed with silk gives positive electricity, and sealing-wax or vulcanite rubbed with flannel gives negative electricity.

Take a piece of thin paper—the white edge off a newspaper will do—and cut a strip, say, about four inches long and about an inch wide. Double it over and bring the two ends together. Now draw a man as shown in picture 2, and cut it out to shape. Do not cut the top, but leave it so that the figure will stand up as seen in



4. An easily-made stand

ELECTRICITY MADE AT HOME

picture 3. If you excite the glass rod, and hold it near one side, the figure will roll over towards it, and if you then hold the excited vulcanite or sealing-wax at the other side he will roll back that way, and so you can attract him all round the table.

Another experiment is to make a tiny ball of pith out of the centre of an elderberry stick. This pith is very light when it is dry, and can easily be made into a small ball about as big as a pea. Fix the ball to a thread of silk, and the silk to the gas-bracket or something where it can hang down. Now excite the rod by rubbing and hold it near. The pith-ball will fly toward the rod, but after touching it it flies away again, and will keep off as long as the electricity remains in the rod. But if you have used the glass rod and then bring the vulcanite or sealing-wax near, the ball will fly to it. This shows the difference between the two kinds of electricity. Instead of the pith-ball we can use a little piece of feather if we cannot get the pith, but pith is the better. Instead of hanging the pith-ball from a gas-bracket, we can easily make a stand as shown in picture 4. This is made of a bottle with a piece of copper wire stuck through the cork. We bend the wire over as shown, and make a loop or a hook in it to tie the silk thread to. With the pith-ball we can prove that when we rub the glass with silk, or the vulcanite or the sealing-wax with flannel, the silk or the flannel also become electrified. If we roll the silk or flannel into a ball, and after rubbing the rod with it hold it near the pith-ball, the effect will be the same as if we held the rod near the ball.

Take a piece of the white margin of a newspaper and draw a picture on it like picture 5, about two inches in height. Then cut it out to shape. Cut a small hole at the hands, but be careful to cut it round and clean. Make it big enough for the head of a pin to go through. Now we take a piece of cotton thread and run one end through the hole in the paper acrobat. We now tie the ends of the cotton to two chairs or other objects, but we must see that the thread is drawn quite tight, as seen in picture 6. Now, if we excite the rod we can make the paper acrobat swing round and round after the rod.

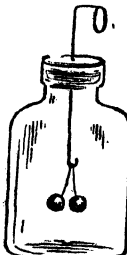
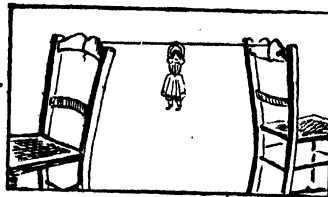
The pith-ball electroscope is a contrivance which will be very useful in many electrical experiments, and it is easily made. With the electroscope we can always test the presence of electricity, and not only so but can come very near to making a good estimate of its strength. First of all we must obtain a glass pickle bottle with a big mouth, and clean and dry it thoroughly. Then we must get a piece of copper wire and put it through the cork. We can do this if

we make a hole in the cork with a skewer or a nail. The wire should be a little thicker than ordinary electric-bell wire. If we have to buy it we ask for No. 14, but any piece of fairly stiff copper wire will do. When we have put it through the cork, we bend one end—the one to go inside the bottle—into a small hook-shape. The other end is to be first bent round like a ring, and then the ring is to be bent down at a right angle. Then we shall have a piece like picture 7.

Now make two small pith-balls and hang them each on a piece of cotton, both the same length. Tie the two ends on to the hook in the wire and put them into the bottle and fix the cork in. The pith-balls should then be about two inches or three inches from the bottom of the bottle, as shown in picture 8. Of course, we must not forget to see that the bottle and everything else is quite dry. Now, if we excite the rod and touch the top of the wire with it, the two pith-balls will become excited, and, as both will be charged with the same sort of electricity, they will stand out apart from each other, and if we bring anything which is electrified against the copper wire we shall see the pith-balls move.

We can make electricity on a larger scale than this. Borrow a wooden lacquered tray and cut out a piece of thick brown paper (the sort of paper that large and heavy parcels from the stores are wrapped in) the same size as the inside of the tray, so that it lies flat on the bottom of the tray. Gum two slips of paper at each end of the sheet to serve as handles. Have the tray supported on two dry glass tumblers (to prevent the electricity leaking away), and warm the sheet of paper at the fire until it is thoroughly dry and hot. Rubbing will help to dry it. Then put it quickly on the table and brush it hard with a warm and dry hard clothes brush. Put it on your tea-tray which is resting on the tumblers, touch the tray with your finger and lift away the sheet of paper by the handles you have fixed to it. Then put your knuckle close to the tray and you will get a spark, which you can get half a dozen times if you repeat the process of touching the tray, lifting away the brown paper, and putting your knuckle to the tray.

These experiments are the simplest that we can undertake, and it was by simple experiments such as these that great inventors came to understand the mysterious powers of the force which has not only made possible but has now brought so near to perfection such wonderful inventions as the telephone and the telegraph, and the motors and dynamos that drive railway trains and trolley-cars.



MORE GAMES TO PLAY BY THE FIRE

ON page 253 of our book are some good games that can be played while sitting by the fire. Here are more games which we can play indoors.

WORD-MAKING

NEAR the top of a slip of paper each player writes down a word given out by the leader of the company. Then all start to make a list below it of other words, spelt from the letters it contains—and these letters only. When the leader says that time is up (about ten minutes should be allowed), the lists are added up, and the player who has made the largest number of words is the winner. It is not necessary to choose a very long word, for it is surprising how many words may be made from the letters contained in any word of ordinary length. For example, from the word "animal" we can get: am, nail, main, lain, and so on.

CONSEQUENCES

EACH player is provided with half a sheet of notepaper and a pencil. The game begins by writing at the head of the paper the name of some friend, a man, and a verb to show what he did. Thus: "Mr. Smith met." The written words are then folded over out of sight, and the slip of paper is passed on to the next neighbor, no player, of course, knowing what another has written. Everyone now writes the name of a lady, folds the paper and passes it on again.

This time each writes down what he or she thinks was said or done by the people whose names are hidden, and, having folded the slip, passes it on, when everyone adds the words, "and the consequences were"—whatever they like to write down. This being done, the papers are collected and someone reads out the slips. The consequences of these mixed-up tales are generally very funny.

MAGIC ANSWERS

THIS is a game in which two of the players form a plan between themselves to puzzle the rest. One of these two leaves the room, while his partner remains behind to choose with the rest of the company some object to be guessed. The one outside is then recalled and questioned by his accomplice as to what this object is. Several things are touched. "Is it this?" "Is it this?" he is asked. To every inquiry he answers "No," until something is mentioned that has four legs, and as he and his friend have previously arranged that such an article shall not be referred to till just before the real object is named, he knows that the next question may be answered with a "Yes!"

The secret can be made more difficult for other players to find out by altering the plan, and agreeing that a certain number of questions, let us say six, shall be asked after mentioning the four-legged article before the chosen object is referred to. But several little variations of this secret game will, no doubt, suggest themselves to our readers.

CLUMPS

THE players divide into two parties. One player from each party leaves the room, and between them they think of some article or thing, let us say, "The clock on the Metropolitan tower." While they are outside, the rest form themselves into two circles, one at each end of the room. On returning, one of the "thinkers" goes into each of these circles, where he is plied rapidly with questions, the answers to which must only be "Yes" or "No."

Each player takes it in turn to ask a question—"Is it animal?" then "Is it mineral?" "Is it vegetable?" "Is it in United States?" "Is it in this room?" and so on, and the side that guesses the object first claims both "thinkers," and so adds to its numbers, and the game begins again. When the players are tired, the biggest side has won.

SIMON SAYS

SIMON stands up in front of the row and, with a finger or thumb held up, cries: "Simon says, turn up!" All the rest must immediately do as he does. Then he gives the order: "Simon says, turn down!" And each must point downward. He watches carefully the while to see that no one disobeys him. If presently he gives an order, omitting the words "Simon says," anyone who obeys it must at once pay a forfeit. It is a trap that a player easily falls into, and great care must be taken not to do as Simon does unless the command begins "Simon says."

PROVERBS

WHILE one of the players is out of the room, the rest think of a proverb. It should contain at least as many words as there are players.

The boy or girl who has been sent out is now called back, and begins the game by asking the first in the row a question. This question may be of any kind, but the answer to it must contain the first word of the proverb. The next is then questioned, and replies with the second word, wrapped up, as it were, in the answer. The longer the answer the more difficult it will be for the questioner to pick out the word that helps to make the proverb. But no answer should contain more than a single sentence.

Supposing the proverb to be, "It is never too late to mend," and the first question is, "How many apples do you eat in a day?" the answer might be, "As it is not wise to eat too much of anything, there are some days when I don't eat apples at all." The word "it" is not easy to notice in this sentence. But it would be more difficult to hide the last word in the proverb.

Let us take as a question, for example, "Are you fond of reading?" The answer might be, "Yes; but I tore the pages of my favorite book, and must mend them before I can go on with the story." If you wish to puzzle the questioner you should not let your word begin or end the sentence.

THE GAME OF ZOO-GUESS

EVERYONE at a party was trying to think what a "Zoo-guess" could be, when the door opened and a maid brought in a big board with two sheets of white paper pinned to it. She placed the board on two chairs at one end of the room. At the other end Etta's mother sat at a table, and in front of her the children saw a bundle of little pink envelopes.

"First," the mother explained, "every boy must choose a partner.

"Now," she said, "I want two couples to come first. The boys will take these two black chalks, and they will stand by the board. The girls will stand by me at the table. I shall give them each an envelope, and when I say 'Go' they must run to their partners and give them

and remember that the girl who gets back to me first wins." Then she called out: "One, two, three—go!"

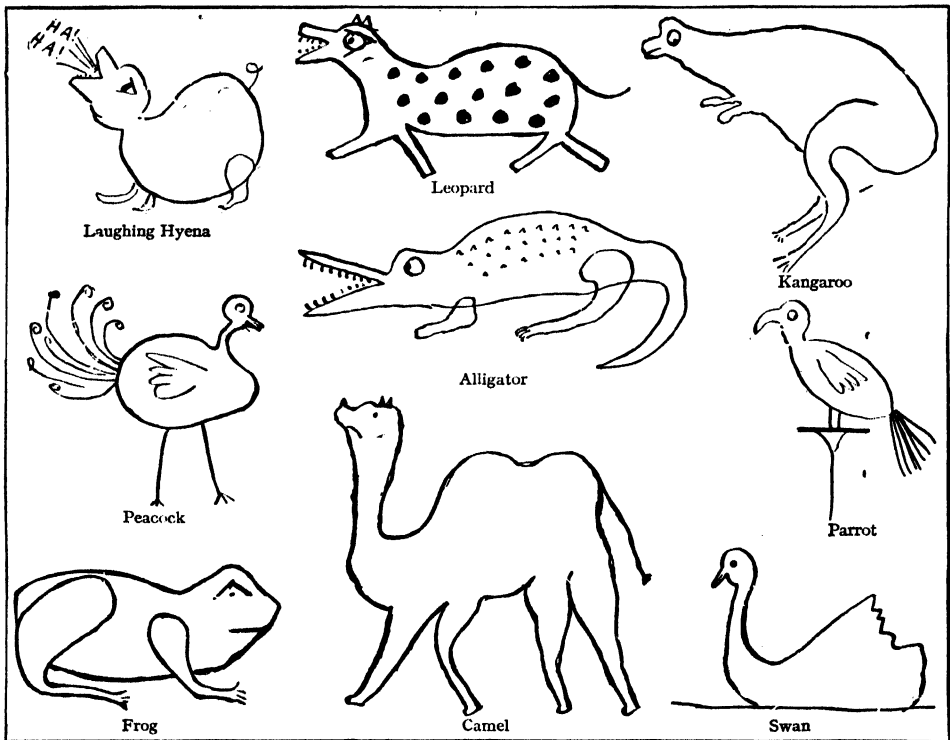
Both girls ran as hard as they could down the room till they reached the boys. Then they gave up the envelopes, which the boys tore open as fast as they could.

All the other children were excited now, and leaned forward to watch.

The boys read the names of the animals on the pieces of paper they found in the envelopes, and then tried to draw them.

At first they only made marks that did not seem to mean anything.

Then one of the girls saw a curly line that looked something like an elephant's trunk,



Some of the animals the children had to guess.

the envelopes. The boys will open the envelopes, and they will find pieces of paper inside with the names of animals written on them. Then, as quickly as possible, they must try to draw the animals on paper, while their partners watch. The moment the girls can tell what the boys are trying to draw, they must run to me and tell me what the animals are meant for, and the girl who gets to me first will win a prize."

Then the fun began.

Two boys, with the black chalks ready, stood by the board, and their two girl partners stood at the table.

Etta's mother gave each girl an envelope, and said: "Now run as quickly as you can,

and, without waiting for anything more, she rushed back to Etta's mother at the table and said: "It's an elephant."

"Wrong! Go and look again."

The girl ran back and looked again at the queer thing her partner was trying to draw. She saw now that the curly line she had mistaken for a trunk was meant for a swan's neck, but before she could run back the other girl had managed to guess what her partner was drawing, and so won.

Of course they made mistakes, because they were so anxious to tell Etta's mother what the animals were, and so win a prize, that they never waited for the drawing to be finished, but began to guess the moment they saw a

beak, or a tail, or a neck that they thought they knew.

Sometimes the two girls would guess what their partners were trying to draw at the same moment, and then there would be a tremendous race down the room to see which could tell Etta's mother first. These races were really the best part of the fun, because

sometimes the girls got so excited that when they got to the table they could not say the animals' names properly.

When the game was over, Etta's mother gave prizes of chocolate animals to those who had guessed quickest, and all the children said they had never enjoyed a party so much.

THE PUZZLE OF THE MILLER'S SACKS

(SOLUTION TO BE FOUND ON PAGE 2271.)

A MILLER had some sacks of flour, each sack bearing a number. He arranged them as shown in the picture, which, as will

be observed, shows a set of three sacks in the middle. Next these on each side is a pair of sacks, and on the far side of each pair is a single sack. Now, something curious may be observed about the figures. If we multiply the number on the left-hand pair, 28, by the number on the single sack next it, 7, we get 196, which



is the number on the three sacks in the middle. But if we multiply the number on the remaining pair, 34, by the number on the other single sack, 5, we do not get 196.

The problem set by the miller to his friends, as explained by Mr. Henry E. Dudeney in his "Canterbury Puzzles," is to place the nine sacks, with as little trouble as possible, so that each pair, when multiplied by its single neighbor, will make the number in the middle.

HOW TO MAKE YOUR OWN TAFFY

THE great thing in making sweets, and quite as much with taffy as any other, is to secure a good reliable recipe, and to follow it exactly. It is never worth while to guess at quantities; weigh everything carefully and correctly, and if possible include all the ingredients mentioned in the recipe. Another little hint worth heeding has to do with the quality of the materials used—let them be of the best quality you can obtain.

Taffy may quite well be made over a gas-stove, or on a cooking-range, but if it has to be made over an ordinary open fire it certainly must not be a dull or smoky one, but one with clear red embers. The saucepan is the next consideration, and it is an important point to see that it is scrupulously clean; besides this, it should be a large one in proportion to the ingredients that are to be put into it, because, when boiling, the liquid sweet-stuff sometimes rises very quickly in the saucepan, and it must not be allowed to boil over.

We have our scales and various weights, and to make the taffy we must proceed to weigh these ingredients:

Four ounces of butter. One pound of brown sugar. Mix these well with a tablespoonful of water. Add four ounces of molasses and the strained juice of half a lemon.

WHAT THE JESTER DID WITH THE ROPE

THE jester in his prison, as described in the problem on page 2034, looked at his precious piece of rope, and wished it were elastic, so that he could stretch it and make it long enough for him to reach the ground with it. Fortunately the rope was stoutly made, though it was too short.

While fingering it the jester saw how thick and strong the strands of the rope were, so he began unwinding them. Then he thought, "I will untwist the rope and see if it is possible to join the separate strands in such a way as to make a long rope." This he set about doing, and when the untwisted strands lay on the

It is well to put the butter into the saucepan first, and let all the ingredients melt slowly.

Great care must be taken to prevent burning, and the taffy must not be left unattended at this stage for a moment. Nothing is better to stir with than a wooden spoon. It is almost impossible to tell exactly how long to boil the taffy—about seven minutes—but a reliable test to show that it is well cooked is to drop a small quantity of the liquid into cold water; if it be cooked sufficiently, as it becomes cold in the water it will appear crisp and hard. It may then be taken from the fire.

A large, well-greased dish should be in readiness, into which the taffy is poured. It must be left for a short while, but before it is cold it must be cut with a knife in small squares, but should not be removed from the dish until considerably harder than it is, when this marking with a knife may easily be done.

When quite cold it should be stored in a tin to keep it crisp and dry. If we wish our taffy in its daintiest form, we may wrap each square in a tiny piece of oiled paper. It is very necessary to add the caution that great care should be exercised in pouring the hot liquid from the saucepan to the dish, as a burn from this sticky, sugary liquid is terrible.

prison floor, he took up the ends and intertwined them as he had seen a sailor do when splicing a rope. Then he tugged at the ends with all his might, and, finding the join was firmly made and the rope quite strong, though much thinner, he waited till night-time. He had previously loosened one of the bars in his window, and, tying one end of the rope to the upper bar, he wriggled his body through the window and let himself down by the rope into the moat.

He had judged the length of rope very truly, and soon found himself in the water. In a minute or two he had scrambled out of the moat and got safely away.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 2261.

YOUNG AMERICANS OF THE WEST INDIES



The town of Charlotte Amalie, on St. Thomas, is built on the harbor side of three high hills. Many streets for foot-passengers like these connect the different levels. Vehicles must wind around the hills. These young Americans are on their way down to the water. All learn to carry burdens on their heads.



The population of Porto Rico is chiefly white, but there are many negroes, and more of mixed blood. Some of the people show white, negro and Indian descent. Some of these races are shown in this picture of lace makers. Girls begin to make lace when very young, and some learn very beautiful patterns. Pictures on pages 2146, 2147 and 2157 copyright by Newman Traveltalks and Brown and Dawson, N. Y.

The Book of THE UNITED STATES



THE ESCOLTA, THE PRINCIPAL BUSINESS STREET OF MANILA

AMERICAN TERRITORY ACROSS THE SEAS

YOU have learned how the people of the thirteen old states on the Atlantic climbed the mountains, floated down the rivers beyond, and then crossed the Mississippi River, the "Great Father of the Waters."

The wagon trains made their toil some way over the plains, reached the summit of the Rocky Mountains, and, at last, came to the Pacific. By purchase, by exploration and by conquest, we gained the territory which we now know as the United States.

SOME OF OUR POSSESSIONS IN MANY SEAS

For a considerable time this was all, but if you now look in the great atlas in the schoolroom or on your father's desk, you will find that our country holds much territory separated from the states of the Union. In the list you may find the following: Alaska, Aleutian Islands, Baker Island, Canal Zone, Guam, Hawaiian Islands, Howland Island, Marcus Island, Midway, Wake and Johnstone Islands, Philippine Islands, Porto Rico, Tutuila and the Virgin Islands.

Some of these names, I am sure, you have never heard before. Perhaps you remember when others became possessions of our country, or you

CONTINUED FROM 2057

can remember when some friend or relative went to work in Porto Rico, or came home from the Philippines; or when some friend came back from Panama, where he had been helping to dig the great Canal. Then too

you may have read that we have sent armies to Cuba. Yet Cuba is not on our list. We shall see what we have to do with that country soon.

ALASKA AND THE MANY ISLANDS AROUND IT

The first of our possessions in size and importance is Alaska and the Aleutian Islands, which are really a part of it. The area is 586,400 square miles, according to the latest survey, which is about one-fifth the size of the United States proper, and about the size of the German Empire, France and Spain taken together. It cost when we bought it from Russia about two cents an acre.

It is a wonderful country of high mountains, great plains and broad rivers. From some of these mountains, great ice rivers, or glaciers, about which you read on page 2531, slowly slide down to the sea. There huge sections break off and become icebergs. When your editor studied geography in school, the book said

that Mt. St. Elias (over 18,000 feet) was the highest mountain in North America. Your geographies tell you that Mt. McKinley (20,300 feet), which had not been measured or even discovered then, is the highest.

Along the coast are more than eleven hundred islands, known as the Alexander Archipelago. Some of these are high mountains with great forests on their sides. Stretching to the west more than 1,000 miles beyond the mainland and reaching almost to Asia are the Aleutian Islands.

In another place we tell you how the country became a Russian possession, in 1728. It remained so nearly a hundred and forty years, but it had never paid Russia, and so that country sold it to the United States in 1867, for \$7,200,000. A few people in California and Oregon thought that the furs and the fisheries would be valuable to the country, but nearly every one else laughed at the purchase of polar bears and icebergs.

So little attention was paid to the country that the United States did not even provide any sort of government until seventeen years later, though it was supposed to be under United States laws. During the year seal and whale hunters made camps on the islands stretching out toward Asia, and a few fishing vessels touched the coast. Trappers and hunters wandered through a part of the country, but there were hundreds of square miles never seen by white men.

GOLD IS DISCOVERED AND A RUSH TO ALASKA BEGINS

Though stories of finding gold often came down the coast to Oregon and California, they did not cause much excitement until 1896. Then it was told that rich finds had been made on the Yukon River in the region known as the Klondike in Canada, and thousands of people hurried there. Gold was also found on the American side, and in 1898 still richer deposits were found at Nome on the western coast.

When the news of all these discoveries was carried over the world, another rush like that to California fifty years before occurred. Every old steamboat on the Pacific coast was pressed into service, and carried struggling crowds toward the golden North. Once landed, on foot, or with sledges drawn by dogs, they strove

to make their way over the hills and across the streams toward the goldfields. There were no roads, only paths called trails, where the snow had been beaten down by the feet of men and the runners of sledges. We shall tell more of this in another place, and also of the mines of coal, iron and copper.

Not all of Alaska is bitterly cold. The warm winds from the Pacific bring moisture to the coast, and the high mountains shut off the cold Arctic winds. Rain falls on more than two hundred days in the year. Great forests are seen, and the meadows furnish excellent hay. In much of the country our ordinary vegetables can be raised during the short hot summer, and some grain also grows. But in the interior the temperature is often 50° below zero during the winter, and a few feet down, the ground is always frozen. Alaska is now organized as a Territory of the United States.

ANOTHER POSSESSION WHERE IT IS ALWAYS SUMMER

Far to the south of cold Alaska are some Pacific islands where it is always summer. These are the Hawaiian Islands, which were annexed to the United States at the request of the inhabitants in July, 1898. There are eight of these upon which people live, though one of these is almost deserted, and twelve smaller islands. The natives visit these tiny islands to gather the eggs of the sea birds.

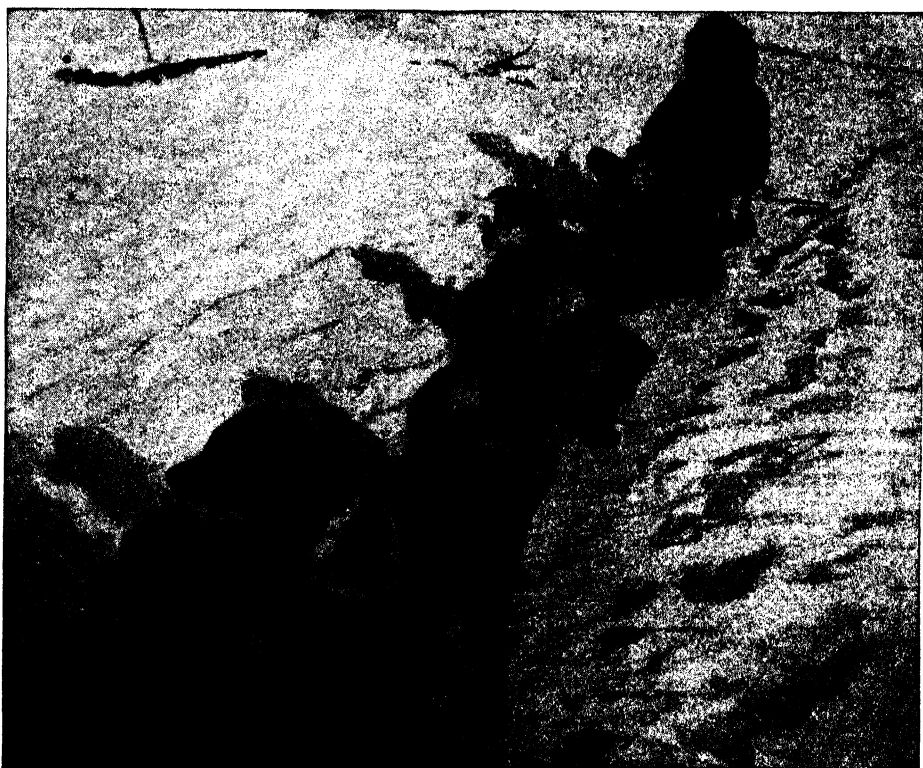
All the islands taken together are not large, as they contain only about 6,500 square miles. That is, all together they are larger than Connecticut, but not so large as Massachusetts. The largest is Hawaii, but Oahu, which contains Honolulu, the chief city, has more people. Honolulu, itself, has more than 50,000 inhabitants.

These islands were made, the wise men tell us, by volcanoes which pushed up from the sea bottom and poured out their lava. This decaying lava makes a rich soil, and since there is much rain, everything grows like magic. Some of the volcanoes are not dead. Kilauea on Hawaii is the largest active volcano in the world. The crater, that is, the bowl-shaped top of the mountain, is about nine miles around, and in the centre is a great lake of melted lava, which rises and falls like water in a reservoir. At night the sight of this red-hot, quivering mass is

ROUGHING IT IN ALASKA



Sheep Camp was one of the early camps set up by the gold diggers of Alaska. Here we see the residence and office of the principal doctor in the place at the time. Though trees grow near, no one had time to build regular houses, and no one was willing to work for wages when he might be digging for gold.



If you will get the map of Alaska you will find the Allenkakat River just a little north of the centre. For several years, this boy, William Campbell, was the only white boy in the whole region. He has harnessed his puppies just as if they were full-grown dogs, and is teaching them to draw the sled, which will be their regular business when they are older. Without dogs the exploration of the country would have been difficult.

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one of the most wonderful sights to be seen anywhere.

EARLY EXPLORERS OF THE ISLANDS

These islands had been discovered by Spanish ships before the year 1550, but little notice was taken of them until Captain Cook, of whom you read on page 1484, visited them in 1778. He called them the Sandwich Islands, in honor of the Earl of Sandwich, and on his second visit quarreled with the natives, who killed him. Another brave British explorer, George Vancouver, of whom you have read, left some cattle on the islands a few years later, and taught the people how to build boats.

American missionaries went to the islands in 1820, and soon the leading natives, who belong to the brown race, called themselves Christians. Many of the people still followed their heathen gods, and it is said that some do to the present day. The royal family died out in 1872, and Kalakaua was elected king. He was a very bad ruler and tried to restore the idols and to take away the liberties from the people.

THE PEOPLE DRIVE THEIR QUEEN FROM HER THRONE

On his death in 1891, his sister Liliuokalani tried to follow in his footsteps. By this time there were many white people on the islands. Some of them were the children and grandchildren of the missionaries, and others had gone there to trade. They put the Queen off the throne in 1893, declared themselves under the protection of the United States, and asked to be joined to that country. This was not allowed at the time, but they refused to allow the Queen to become their ruler again, and governed themselves as a republic. At last, in 1898, they were joined to the United States and are now governed like newer states of the Union once were, that is, as a Territory. They have a delegate in Congress who may speak but who has no vote.

THE WHITE MAN'S WAYS PROVE FATAL

Since they were annexed, wealth has increased. The principal crop is sugar cane and pineapples, though rice, coffee, hemp, tobacco and bananas are grown for export. The greatest trouble is the scarcity of labor. The white man's whiskey, as well as the white man's Bible,

came in with the trading ships, and many of the natives became drunkards. Then, too, the white man's diseases have caused the death of many. It always happens among uncivilized people that a new disease does more harm than it does among the people who are accustomed to it. The natives are now dying out and only about 26,000 of the pure blood are left, and half as many more who are part Hawaiian. Once there were five or six times as many.

Many whites of Portuguese descent were brought in to work on the sugar plantations, but now they do work which is better paid. Then Chinese were brought in and many of them have become prosperous farmers. They have in many cases married the native women and their children are often good citizens. The Japanese came next, but many of them stay only a few years before returning to Japan, but their places have been taken by others.

The Japanese have made some trouble for the owners of the plantations and for the officers of the law. A few years ago, it is said, they formed a plot to capture the islands and turn them over to Japan, but no attempt to carry out the plan, if there was such a plan, was made. It is supposed by some people that Japan is anxious to get the islands as a stopping place for her navy.

THE SAD STORY OF THE LEPER ISLAND OF MOLOKAI

Perhaps you have heard of the leper island of Molokai. Leprosy is a terrible disease which slowly eats away the skin and flesh. It is said that it was unknown among the islands until brought from China about sixty years ago. Since 1865 all lepers have been sent to the island of Molokai, where they are well treated, have good houses and abundant food. A well person may go here with a loved one, but may never return, and in many cases is attacked by the disease.

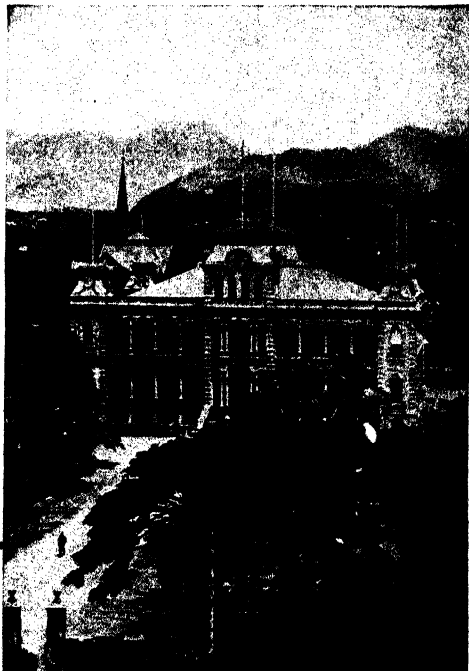
It was here that Father Damien, about whom you read on page 71, lived and died. Now there are three churches on the island and a home for boys and another for girls. These homes are supported and managed by a Catholic sisterhood of American women. Every effort is made by the government and the churches to make life pleasant, but after all it is a living death.

Life on the other islands is pleasant

THE BEAUTIFUL HAWAIIAN ISLANDS



The Hawaiians believe that they have the most beautiful country in the world. On the left is a rice field, and on the right is a corner of a banana plantation. The banana is one of the chief articles of food of the natives, and produces very heavy crops. Hawaii also produces a great quantity of sugar, and many fine pineapples. The climate is delightful, and life on the islands is easy and pleasant.



The grass hut on the left is the kind of house in which thousands live. In striking contrast is the old palace of the kings in Honolulu, now used as the government house by the governor and other officers.

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in many ways. The climate is delightful, game and fish are plentiful, fruits and vegetables of many kinds are grown. One who has once lived on these islands always desires to return.

The natives are fond of games and sports of many kinds. Even the babies are good swimmers, and a favorite amusement is riding on a narrow board over the surf, as it beats upon the shores. Nature furnishes food, little clothing is needed, and therefore most of the natives refuse to do much work.

ANOTHER GROUP OF ISLANDS AND THE SAVAGE INHABITANTS

Further to the south and further west is another group of islands over which our flag floats. These are the Philippines, named for Philip II of Spain, and first seen by Magellan, as you were told on page 66. There are over three thousand of them, but two are much larger than all the others taken together. Nine more have more than 1,000 square miles each, while some are only points of rock. All together they have about the same area as Virginia, North Carolina and South Carolina. The population is now about 9,000,000 of which not over 25,000 are white.

There are many high mountains with about fifty volcanoes. Twenty of these are alive. Earthquakes are frequent, and in many places the surface of the land is either rising or falling. The land is fertile and great forests cover a large part. There are two seasons, the wet and the dry, and during the first some rain falls almost every day.

NATIVES BLACK AND BROWN; PEACE-ABLE AND SAVAGE

The first inhabitants were black, the wise men tell us, and from them the Negritos are descended. The Malays then invaded the islands, and after a time other invasions drove the first into the hills. From this first invasion come the Igorrotes and other pagan tribes. These are the famous head-hunters. Some of their conquerors became Christians, and the seven great tribes of them are called Filipinos. Then another and later Malay invasion arrived, but this time it was the Mohammedan Malays, and from them are descended the fierce Moros. So one can say that the native inhabitants are the Negritos, the pagan Malays, the Mohammedan Malays and the civilized Malays.

The Moros would have conquered the islands, if the Spanish had not come in 1565, to take possession. Not all the islands were conquered, but the Spanish tried hard to make all the people Christians. Both the Chinese and the Dutch tried to capture the islands but failed. England took Manila during the French and Indian War about which you read on page 896, but gave them back at the end of the war.

THE BATTLE OF MANILA BAY WON BY COMMODORE DEWEY

You may read in another place of what we call the Spanish War. When the United States declared war against Spain, Commodore Dewey with an American fleet sailed into Manila Bay, and destroyed the Spanish fleet on May 1, 1898. A few weeks afterward the city itself surrendered. When peace was finally made the United States kept the islands, but in return paid Spain \$20,000,000.

Just at this time the Filipinos under Emilio Aguinaldo had been fighting for their freedom. When they found that the United States did not intend to grant their independence at once, they revolted against this country, and were not conquered for several years. Finally Aguinaldo was captured, and his followers gave up.

The United States has announced that when the people are prepared for it, independence will be granted, but many of the Filipinos think they are ready now. The governor is appointed by the President of the United States and gradually a larger and larger measure of self-government has been granted to the people. The islands are represented in Congress by two delegates who may speak but may not vote. William H. Taft, later our President, was the first governor, and did much to start the machinery of government to running smoothly.

WHAT THE ISLANDS PRODUCE; WHY THEY DO NOT PRODUCE MORE

The resources of the islands are very great. Gold, silver, iron, copper, sulphur, petroleum and salt are found. The production of gold is important. The timber is very valuable and includes many kinds so hard that they cannot be cut by ordinary saws. Some of these take a high polish. There are thousands of coconut palms, as you see in our pictures.

The most important article sent out

SCENES IN THE PHILIPPINES



The coconut palm furnishes food, drink, oil, timber, and rope. A tree produces about 100 nuts a year. Here you see a grove with the nuts piled up ready for market, and a raft of them on the way to Manila.



The methods of farming have not changed very much for centuries. The buffalo or carabao is the chief beast of burden, but some farm machinery has been introduced by American planters. Mayon is one of the most beautiful volcanoes in the world. The town at the foot is Legaspi, Island of Luzon.



The Negritos are of African descent and are growing fewer. They are fearless hunters. The picture on the right shows a village of the Igorrotes, who are fierce and bloodthirsty. The heads of their enemies, not long ago, were valued as trophies. Under American rule head-hunting has almost entirely died out. Copyright by Keystone View Co.

from the islands is hemp, about which you are told in another place. Next come copra, or dried coconut meat, and sugar from the sugar cane. Good coffee is grown and the cocoa tree is also found. Philippine tobacco finds many admirers. Our Indian corn grows well, rice is a good crop, and sweet potatoes form a large part of the food of the people. The soil is rich, and if properly cultivated would produce even larger crops. White men have trouble in working in the climate, however, and the natives work as little as possible.

Since a very little labor will produce enough for their simple wants, they take many holidays. They do not like to use new tools. If you look at the plough in one of our pictures you will see that it is only a forked stick. Many Filipinos have little desire to improve their condition. Wonderful changes have taken place since the Americans took charge. There are now many good schools and good roads, machinery is being introduced, and many families are becoming prosperous.

SPAIN'S FAILURE TO BUILD AN EMPIRE IN THE WEST INDIES

Now we turn to the Atlantic Ocean, where are other possessions of our country, also gained in the Spanish War. But let us see first what this war was. Spain at the end of the nineteenth century still controlled Cuba and Porto Rico, but the Cubans were very restless. Many times they revolted, and the revolts were put down, but only for a little while.

In 1895 a fresh rebellion began. Spain had learned nothing by experience and attempted to crush this revolt by strong measures. General Weyler, who had been Governor-General of the Philippines, was put in charge, and began to burn the houses and crops, and to drive the people into the towns, where they were kept prisoners. President Cleveland objected, but was told that he must not interfere. The anger of the American people grew, and Spain removed General Weyler, but no other change was seen.

THE MAINE IS DESTROYED IN HAVANA HARBOR AND WAR FOLLOWS

Finally when one of our battleships, the Maine, was in Havana Harbor, she was blown up, February 15, 1898, and more than two hundred and fifty lives were lost. It was believed that a mine had been exploded underneath her, and

the people demanded that Spain be punished. President McKinley tried to avoid war, but could not succeed, and April 19th, Congress declared that Cuba ought to be independent.

The first victory was the capture of Manila by Commodore Dewey. Troops were landed on Cuban soil on June 22nd, and the next day, and again on July 1st, battles were fought near Santiago. A Spanish fleet under Admiral Cervera, which had come from Spain and entered the harbor of Santiago, suddenly came out, July 3rd, with the hope of escaping the blockading fleet. This fleet, under Commodore W. T. Sampson, with Commodore Schley second in command, followed and a running fight took place. One by one the Spanish ships were either sunk, or set on fire and run on the shore. After the fleet was destroyed Santiago soon surrendered with 23,000 men.

THE ISLAND OF PORTO RICO CAPTURED AND HELD

General Miles was sent to Porto Rico, another Spanish island east of Cuba, with a force of 17,000 men. This force had little fighting to do, and soon the whole island was in American hands.

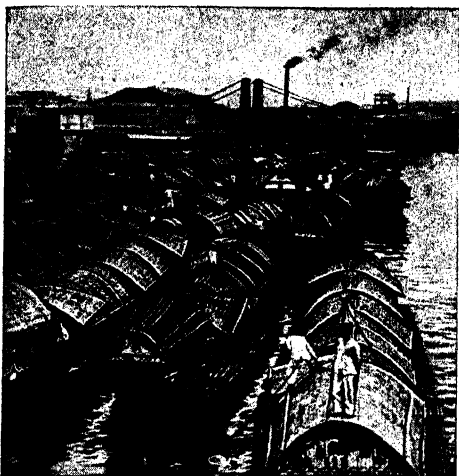
No European nation believed that the United States would keep its promise not to keep Cuba. For a time, soldiers were kept there and General Leonard Wood acted as governor. Schools were established, roads and telegraphs were built and war was declared against yellow fever. It was discovered that the disease was carried from a sick person to a well one, only by a kind of mosquito. So the seaports were made clean, and all places where mosquitoes could breed were looked after.

WHAT CUBA LACKS OF BEING ENTIRELY INDEPENDENT

Then the Cubans were offered control of their government if they would do the following four things: (1) Cuba must make no treaties with foreign powers which would hurt the United States; (2) the country must not go too deeply in debt; (3) it must give to the United States places on its shores to keep coal for the warships; (4) the ports must be kept clean so that yellow fever cannot get started. You see the island is so close to the United States that a ship may easily carry the disease to our southern ports.

The Cubans agreed, formed a constitu-

WORK AND PLAY IN THE PHILIPPINES



Thousands of the people of Manila live in houseboats moored in the Pasig River. Cockfighting is a popular amusement of the people, and on holidays hundreds tuck their pet cocks under their arms and hunt for a chance to fight. Baseball was introduced by the American soldiers and is growing popular. Some Filipinos have become very skilful players, and perhaps may some day win a world's championship.



The chief article of food of the Filipino is rice, and here we see how it is planted. Young stalks, a few inches high, which are grown from seed, are planted in the mud under water. Later the water is drained off. These are Igorrote boys and they seem to be enjoying themselves paddling about in the mud and water. The Igorrotes were wild and savage a few years ago, but are becoming civilised under American rule. Copyright by Keystone View Co.

tion, elected their officers, and took charge of their government in 1902. For a while all went smoothly, but after a time trouble began and an army was raised to drive out the president. In 1906, the United States sent troops again, and kept order until the country became quiet. Then another president was elected and the army was taken away in 1909. So you see that Cuba is not quite free and independent.

But what of the other islands we took from Spain? Porto Rico was visited by Columbus on his second voyage, and later Ponce de Leon, as you read on page 272, became governor. Negro slaves were brought in and the Indians gradually disappeared. For a little while the island was held by the English but afterward was returned to Spain. While Cuba was fighting for independence, Porto Rico was restless but did not declare open war.

PORTO RICO, A WINTER PARADISE FOR TOURISTS

The island contains over 3,600 square miles, which means that it is about three-fourths the size of Connecticut. Three other small islands belong with it. The climate is pleasant, though hot except in the mountains, and the soil is rich. There are large forests of good timber and the coffee tree grows well. Sugar cane and tobacco are the largest crops, next to coffee, but cotton is grown also. Oranges, lemons, limes, grapefruit and pineapples grow wild.

The population, in 1910, was 1,118,000, and is perhaps 1,250,000 now. About two-thirds of the people are white and the others have more or less negro blood. Except in the towns there are few educated people, for when the United States took the island only sixteen or seventeen persons in a hundred could read and write. Our government has built many new schools and a university, and soon we shall see great changes. The people have been given a large measure of self-government.

There is little to be said about Guam. It was taken because we needed a coal- ing station for warships. It is very much like the Philippines in soil, climate and population. Very few whites live on the island. The governor is a naval officer.

THE ISLANDS ROBERT LOUIS STEVEN- SON LOVED

Since we have been naming our chief possessions in the order in which we

gained them, we now go back to the Pacific, where there are so many wonderful islands. One particularly beautiful group is the Samoan or Navigator Islands. They were discovered in 1768 by a French sailor, De Bougainville, but France never made any settlements. In 1839 Charles Wilkes, an American naval officer, surveyed the islands and made a sort of treaty with the chiefs.

Great Britain and the German Empire next began to be interested in the islands, and in 1889, these nations and the United States made an agreement to protect the native king. This king died in 1898, and there was a dispute about his successor. The three nations also could not agree about several matters, and so in 1899, the islands were divided between the United States and the German Empire. The United States took Tutuila and the Manua group, all together about 100 square miles. These islands are important only because of the harbor of Pago-Pago on Tutuila. This is one of the best harbors in the Pacific Ocean, and would be useful in case of war.

LIFE ON THE SAMOAN ISLANDS

The people are brown-skinned, tall and strong. Many of the girls are very beautiful. The climate is mild. Everything grows almost without labor, so that there is time for dancing, singing, feasting, and church-going; for nearly all of them are Christians. Robert Louis Stevenson spent his last years in the Samoan Islands, which he grew to love with all his great heart. The islanders sell cotton, sugar, coffee and coconuts, but as there are only about 7,300 people on Tutuila, you can see that the trade cannot amount to very much. A naval officer is the governor.

While the United States was getting possession of so much foreign territory in 1898-99, it also picked up some small islands. Strange to say there were a number of small islands in the Pacific, which had never been claimed.

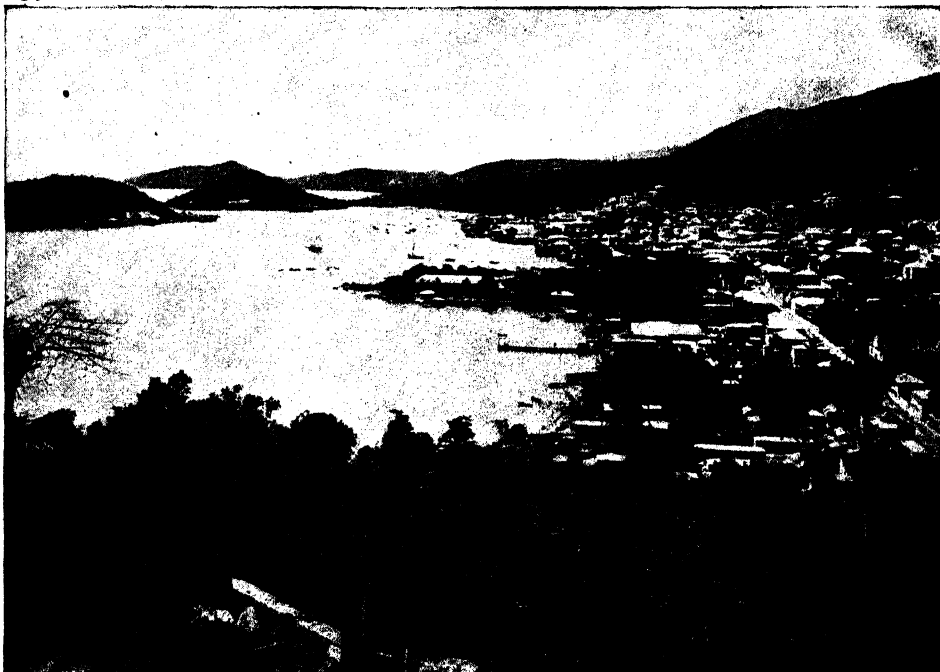
AN ISLAND ON WHICH NOTHING GROWS

Midway Island, for example, is coral sand. Nothing grows upon it, and the only residents are cable operators and a squad of marines. The servants are Chinese or Japanese. Three or four times a year a boat stops to leave supplies and orders, and brings books and

PORTO RICO AND SAINT THOMAS



Aibonito is not one of the largest towns in Porto Rico, but its situation on the hills is beautiful. You see in this picture a strange mixture of the old and the new. You see the old style of architecture and some ugly new buildings; a motor car and native carts and packhorses. The telephone goes everywhere.



Charlotte Amalie, on St. Thomas, one of the new possessions of the United States, has a beautiful harbor. The island was once much larger than it is at present, and what is now the harbor was then the crater of a volcano. As the island sank into the sea, water ran in at one side to form the harbor you see. The town makes a gay show with its pink, yellow and green houses, with their red roofs showing among the trees.

newspapers. When it goes the few inhabitants settle down for another three months of quiet.

Now what is the Canal Zone? We shall not tell you much about the Panama Canal now, but shall leave that for another volume. It is enough to say that the Republic of Panama in 1903 leased to the United States a strip of land five miles wide on each side of the Canal. Over this the United States has entire control for a hundred years and then may continue the lease. The city of

There is an excellent harbor on St. Thomas, and the naval authorities of the United States have long desired it as a base for warships. The islands could have been bought for \$7,500,000, about the time Alaska was purchased, but Congress would not agree. The need of the harbor became greater after the Panama Canal was opened and, in 1917, the islands were transferred to the United States for \$25,000,000. This seems a very high price for a small territory, but if the United States did not buy the



Picture from Press Illustrating Service, Inc.

This is the Normal School at Manila, Philippine Islands, with the woman's dormitory. Nothing shows more clearly what the United States has done for the islands than the provisions made for education of every sort. There are more than 4,000 schools in the islands and teachers must be prepared. There is also a university with a large attendance, and many industrial schools, which teach the Filipinos how to use their hands.

Colon on the Atlantic side, and of Panama on the Pacific side, do not belong to the Zone. The United States has been given the right to see that the cities are kept clean, however.

THE VIRGIN ISLANDS, OUR NEWEST FOREIGN TERRITORY

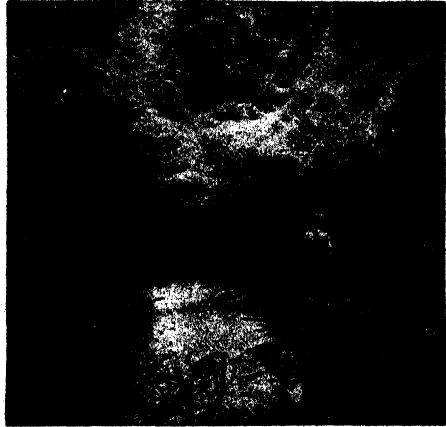
The latest additions to the territory of the United States are three of the Virgin Islands in the West Indies. St. Thomas, St. Croix and St. John, three tiny islands containing altogether only 138 or 139 square miles, and a population of about 30,000, belonged to Denmark for a long time but were an unprofitable possession, and that country was willing to sell.

islands, some unfriendly European power might do so, and so be able to threaten the Canal, our Gulf cities, and Porto Rico.

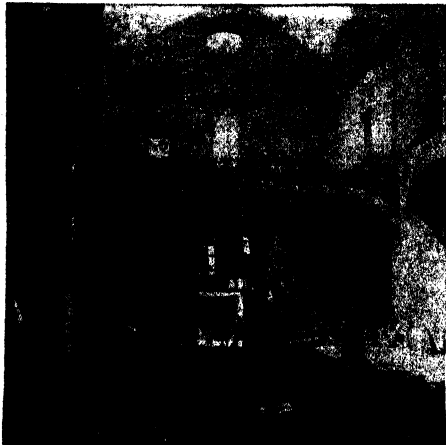
The inhabitants of the islands are nearly all negroes, but most of them speak English, and were glad to become a part of the United States. Much of the land is mountainous, but there are some fertile plains on which sugar cane and tropical fruits grow well. The bay tree flourishes and St. Thomas is noted for the production of bay rum, which your father may use after shaving. The largest town is Charlotte Amalie.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 2377.

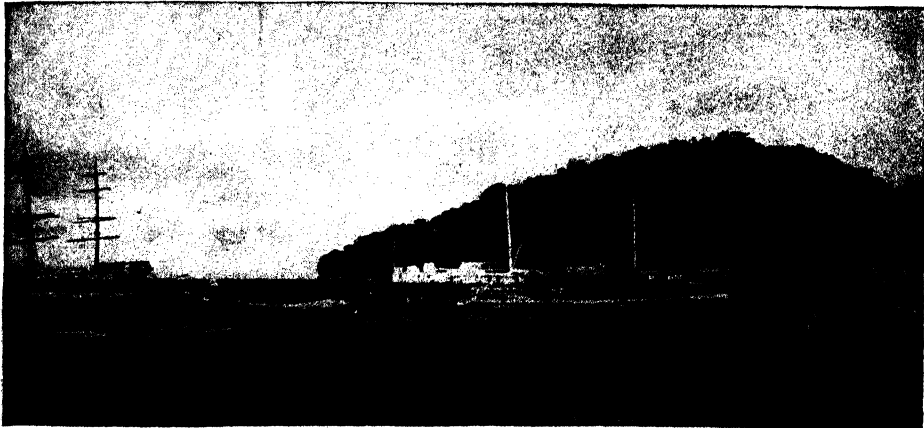
ALONG THE PANAMA CANAL ZONE



Among other tropical plants which grow in Panama is the rubber tree, which you see here. The rainfall and the heat make vegetation of all sorts grow like magic. In a few weeks, vines and ferns grow much higher than a man's head. Making a pathway through the dense jungle is a difficult and tiresome task.



This street, in the city of Panama, with its quaint overhanging balconies, is unlike one of our streets, even if we do see a hydrant. The ruins of the old church show one of the flattest arches in existence.



The Bay of Panama, one of the busy ports of the world, was quiet and sleepy before the construction of the canal, but since the opening many ships drop anchor in the beautiful harbor, waiting their turn to go through the canal. The first ships went through in August, 1914, though much remained to be done.
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PANAMA AND THE COUNTRY AROUND



Sugar cane grows in Panama, and on the left we see a rude sugar-making plant. The cane is crushed between rollers, and the juice is boiled under the shed. The house on the right is the home of a native family.



Panama City is beautifully located, and since the American engineers cleaned up the streets and built sewers, it is a pleasant place in which to live. Much dirt and filth of different kinds were removed and many old houses were torn down to improve conditions. It is not a part of the Canal Zone.
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SHAKESPEARE

The Book of MEN & WOMEN

MILTON



MEN WHO FOUND ELECTRICITY

ELECTRICITY is one of the most wonderful forces placed ready for the service of mankind, yet it is one of the things which hid its secret longest from us. Men discovered how to turn the strength of animals to account; how to make the winds drive our ships across the seas; how to apply the power stored up in coal; how to raise steam, and with it change the face of the world. Yet electricity is greater than these. It can do almost anything. It can light a city, supply power for lifting the heaviest weights, drive trains and trolleys, cook a dinner, heal a sick child, and kill us if we are not careful. It is in almost everything, though it does not move. All that we have to do is to excite it, to bring it out, then catch it, so that we may use it as we need it. It is so valuable and does such marvels that it is hard to believe that it existed for thousands of years in the earth and in the air quite unknown to men.

The very name of electricity tells a story of the mystery in which it was hidden for thousands of years from men. A great man named Thales, of whom we read in another part of this book, who lived nearly seven hundred years before Christ was born, noticed that amber, when rubbed with another material, became heated, and that when in

CONTINUED FROM 2103



that condition it would draw towards itself little pieces of feathers and other tiny light articles. It is said that in the old time the women of Syria used amber to catch up leaves, straws, and other things clinging to their clothes.

A great writer named Pliny, who was born in the year 62 A.D. and died about 114, wrote about amber and its ways. He likened it to the loadstone, the properties of which were well known in his day. We all know that the loadstone is a certain ore which, if allowed to hang by a string, always has one of its points towards the North Pole and the other towards the South Pole, and will attract other metals towards itself. Another thing that Pliny knew was that the electric fish can give such sharp electric shocks as to make a man quite ill. But he never thought that there was any connection between the power of the amber, the fish, and the loadstone.

It was not until the sixteenth century was well advanced that the world began to take a real interest in electricity. Then William Gilbert, a thoughtful scholar, who was one of Queen Elizabeth's doctors, set himself to make experiments with a number of substances to see whether they, like amber, would, when warmed by friction, attract other

JULIUS CAESAR

HERBERT SPENCER

bodies. He found that many, including sulphur, sealing-wax, gems, solid resin, rock-salt, and many other things, had the same power. They would attract metals, stones, earths, fluid, and even heavy smoke.

THE COLCHESTER MAN WHO GAVE ELECTRICITY ITS NAME

As the first man to examine the question, he had to find a name to describe the condition which he excited in these objects. Now, as amber was the first substance known to possess this power of attraction, and as the Greek name for amber is *elektron*, Dr. Gilbert gave the name *electricity* to the condition which heat and friction excited in the things he tried. He is called the father of electrical science. Gilbert lived sixty-three years, and died in 1603. His life was very valuable to the world, for every year since he began his discoveries our store of learning concerning electricity has gone on increasing.

Gilbert was a Colchester man. He was followed by a famous Irishman, Robert Boyle, a son of the Earl of Cork. Boyle was born in Munster, in 1627, twenty-four years after the death of Gilbert. He was a wonderful scholar as a boy, and at ten learned algebra simply because he loved to exercise his mind. He invented a famous air-pump, and taught the world all about the condition and qualities of air. His work for electricity was to show that electricity remained for some time in a substance after rubbing had ceased; and to add new substances which could be electrified. The mere fact that he was noticing electricity was sufficient to set other men thinking about it, for his reputation was very high, especially with the great men on the Continent of Europe.

THE MAN WHO FASTENED TWO THINGS TOGETHER WITH NOTHING

Boyle died in 1691, five years after the death of Otto von Guericke. This clever man was born at Magdeburg, Prussia, in 1602, and after an excellent education visited England and became acquainted there with the scientists of that day. He invented the first air-pump, but that of Boyle's was so much better that the Prussian invention was soon forgotten. Guericke was the first man to show the immense power of a vacuum. He made two hemispheres of

metal—that is, two large metal cups, the edges of which fitted together. There was a tap to each, through which the air could be drawn out by the air-pump. When this was done, so tightly did the two hemispheres cling together that not until the united strength of fifteen horses had been employed could they be pulled apart.

Guericke lived far too early. He discovered a way of making electric light, but nobody knew what it meant. Electric lighting did not become general until 1878. What Guericke did was to make a ball of sulphur inside a globe of glass, then break off the glass so as to expose the sulphur. This he rubbed in the dark, and found that it gave forth a light, accompanied by sound. He it was who discovered also that bodies which have not been electrified by friction become electrified when brought into contact with other bodies which have been electrified.

Sir Isaac Newton did one notable thing for electricity by showing that a disc of glass, when placed in a brass cylinder and electrified, would attract paper so strongly as to make it leap about in the cylinder.

THE MAN WHO SHOWED THAT THE ELECTRIC SPARK WAS LIKE LIGHTNING

Next came the experiments of Francis Hawksbee, who was famous in 1705 as a scientist, when he was elected a member of the Royal Society. It is not known when he was born, though the year of his death is given as about 1713. He made important experiments with air and mercury, and with a machine for producing electricity by rubbing a glass cylinder with the hand. He, for the first time, drew attention to the fact that the electric sparks which he was able to produce, and the crackling noise they made, resembled lightning. His son, Francis Hawksbee, who was born in 1687 and died in 1763, was a gifted maker of scientific instruments, and was the first man in London to lecture and at the same time make scientific experiments to illustrate his theories. The elder Hawksbee wrote much about his discoveries, and his books, translated into French and Italian, were of great assistance to scientists on the Continent.

All this may seem unimportant, but each of these little discoveries led to

other and more important discoveries. A tree in a forest may not seem of much use as a dwelling for a man, but when the tree-feller and the carpenter and the builder have each done their share, that tree becomes an essential part of a house, all the parts of which have been pieced together, just like the building up of a great science. Now we come to the first step which brings us nearer to practical uses of electricity.

Stephen Gray was a Bluecoat boy in London at the beginning of the eighteenth century, and by some happy chance gave up his life to the study of electricity. He made a grand discovery. He found that we can divide matter into two classes—that which can be electrified by friction, and that which cannot be electrified by friction. Then he went a step further and found that the non-electrics could be made electric by being placed in contact with those which were already electrified. This means, as we should say now, that he had discovered that some substances are conductors of electricity, and some are non-conductors of electricity.

THE BLUECOAT BOY WHO SENT ELECTRICITY ALONG A LINE OF THREAD

An ivory ball did not seem a promising thing with which to work, but Gray got a glass tube, and into its ends he fitted two corks. Into one cork he fixed his ivory ball, and, to his delight, he found that when the glass was rubbed it passed on its electricity through the cork to the ivory ball, and the ivory ball would now attract little light things just as the glass itself would. This led Gray to many splendid experiments—little in themselves, but dazzling by their results, considering how he was working in the dark. He tried if silk would conduct electricity, and found that it would not. So he tried pack-thread, and found that that did. He put up a line of pack-thread, and supported it by loops of silk, which would not conduct the current away from the cotton. He was able to send a current of electricity along his line of thread for a distance of 886 feet. That was a wonderful achievement.

An industrious Frenchman was at work on similar lines at this time. This was a man named Du Fay, who, born in 1699, died when only forty years of age, in 1739, three years after Gray. Du Fay

went over Gray's experiments, and went beyond them. He found that glass tubes could be used to hold up the pack-thread, and he found, too, that by connecting himself with the electrified thread he himself became electrified, and that when another person touched him there was a crackling sound, accompanied by a spark. But the great thing which Du Fay did was to find out that there are two kinds of electricity, what we now call *positive* and *negative*.

HOW MEN'S KNOWLEDGE OF ELECTRICITY BEGAN TO GROW

The two kinds exist in a substance, and are at rest until that body is rubbed. Thus two electrified silks will not come together, but silk and worsted will, though two electrified woollen threads will keep as far apart as possible. This is like the loadstone or magnet. That part of the loadstone which points to the north will drive away the north pole of another magnet, but will attract the other magnet's south pole, as if it loved it. North and south go together in the magnet, and opposite kinds go together in electricity.

Inventions now went forward rapidly. Machines were made for rubbing glass cylinders with cushions and other things, and they produced so much electricity that sparks could be formed which would set light to spirits, to wax, to pitch, and other things which were thoroughly heated by friction. The increase of knowledge was now turned to account in a new way. Several men saw that, if electricity could be so easily produced in the open air, it ought to be still stronger if produced in a vessel, away from the free air, where it could be kept and tapped as required, instead of being allowed to escape. This was near the middle of the eighteenth century.

THE SHOCK THAT SURPRIZED THE PROFESSOR WITH A JAR OF WATER

A monk named Cunæus, an inventor named von Kleist, and a professor named Musschenbroek, of Leyden in Holland, each seem to have had the same idea about the same time, and the outcome was what is called the Leyden jar. The professor electrified some water in a bottle or jar, which was covered with a metal stopper, through the centre of which ran an iron rod. From this the electricity could be conducted as it was wanted. The professor made his dis-

covery of the power of the electricity by accident. Holding the jar in one hand, he chanced to touch the iron rod with the other hand, and received such a shock that he declared that he would not for the crown of France risk such another.

THE WONDERFUL THINGS SIR WILLIAM WATSON DID WITH TWO LEYDEN JARS

The Leyden jar, though first made in Holland, was made perfect in England by Sir William Watson, another genius of those early days. Watson was a poor tradesman's son, and was born in London, in 1715. Apprenticed to a chemist, he loved science, and when he had made enough money to live on he gave himself wholly to science. He improved the Leyden jar by covering it inside and out with tinfoil. This had important results. He used wires for carrying the current from one Leyden jar to another Leyden jar. Sending the current along the wire, he found that it gave a shock to the person holding the far end of the wire, two miles away, practically at the very instant at which it was released from the Leyden jar. This proved that the action of electricity is instantaneous—a most important thing, as it afterwards proved in telegraphy. More wonders Sir William did with the mysterious force. He electrified a piece of ice, and with that set fire to spirits. He did the same with a drop of water which had been electrified. He fired the gunpowder in a gun with an electric spark, and showed many powers of electricity which had never before been suspected.

By this time the world was getting to know a great many things that electricity could be made to do, but they still knew nothing of its nature.

BENJAMIN FRANKLIN, WHO HELPED TO FREE AMERICA AND TO FIND ELECTRIC POWER

There was living in America one of the greatest men the world has seen, Benjamin Franklin, the man who first captured fire from the sky and brought it to the ground. He was born at Boston, Massachusetts, in 1706, and began his career, with very little schooling, in a small printing office of one of his brothers. He was very poor, but he had a splendid brain, and never troubled about being short of money. He educated himself entirely by his own efforts. He worked at his trade in New York, in Philadelphia

and in London, and afterward set up in business for himself in Philadelphia. So famous did he become that he was chosen by his countrymen to go to England as their representative. War was about to break out between Great Britain and the American colonies, and he did all that he could to prevent it. Seeing that his efforts were hopeless, he returned to America, where he found that the war had already broken out. He was one of the committee appointed to draw up the Declaration of Independence, and then was sent to France as Ambassador to gain the support of that country against England. After all, he had the delight of opening the arrangements which led to peace between England and America. The last thing he did in public life was to make a prayer to the American Government against slavery in the United States. That prayer of his was not to be answered until many a year after he had been in the grave.

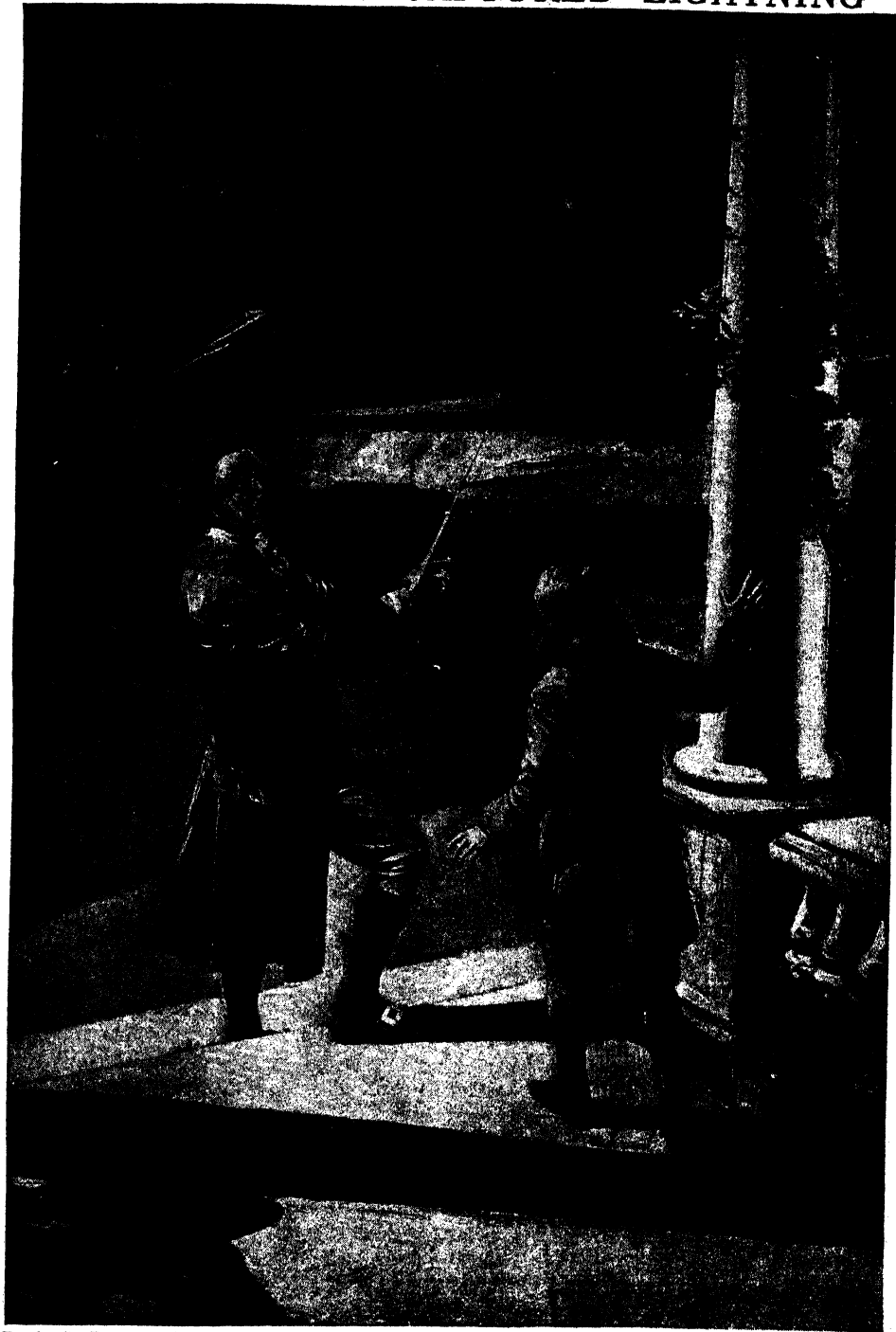
So much for his public life. The more important thing for us here, however, is what he did with electricity.

HOW BENJAMIN FRANKLIN SENT UP A KITE TO BRING THE LIGHTNING DOWN

In the midst of all his work he had time to study and make experiments, so that he was honored all over the world for his knowledge about the tides and the weather, about colors, and, most of all, about electricity. He was one of the men who suspected that lightning and electricity are one and the same thing. But Franklin was not content to remain guessing; he put his belief to the proof. He made a kite of silk, and on the top of it he fixed a thin wire. He tied a string to the kite, but near his hand he attached a silk ribbon to the string, and where the string and ribbon joined he fixed a metal key. Then one day, when a thunderstorm broke over his home, he sent up his kite into a thundercloud, and waited in a doorway to watch the result.

He had printed a statement expressing the belief that everything that had been done with electricity was no more than was to be observed in lightning. Now had come the hour when he was to make his reputation as a scientist secure, or be laughed at by the whole world. He was very anxious as he stood and waited in the doorway with his son. The

THE MAN WHO CAPTURED LIGHTNING



Benjamin Franklin was a young printer who educated himself and became so famous that when he died not only our own country, but also France, where he had been an ambassador, went into public mourning. Here we see Franklin experimenting with a kite, which he sent up into a thunderstorm to see if he could get an electric current from the storm down the string to the insulator which he held. He succeeded, thus proving that electricity is the same force as lightning, and he first showed the value of the lightning conductor.

first thundercloud passed without any sign at all, and Franklin feared. A second came over the kite, and he now saw that little loose strands of the string stood out stiff and bristling. He put his finger towards them, and they were attracted towards it. He placed his finger on the key, and instantly he felt a shock and saw an electric spark. Rain fell now and wetted the string of the kite, and electricity ran down the moistened string, and was so abundant that he was able to fill his Leyden jar from the key.

He had proved that lightning is electricity. He made other trials, and found that some clouds are charged with positive electricity and some with negative electricity, exactly in the same way as in the electricity produced by different bodies on earth. No sooner had he made sure of his facts than he set to work and built lightning conductors. If lightning could be drawn from the skies, as his kite had shown that it could, then surely, he thought, it should be possible to guide into the ground the lightning, which, if left to strike freely, might destroy the house. It was in 1752 that Franklin made his great discovery. He lived for thirty-eight years afterwards, and when he died, in 1790, not only the whole of America but the whole of France went into public mourning for him.

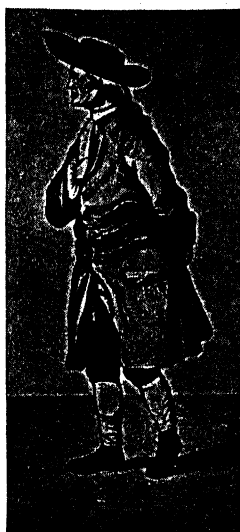
Discovery was now well on the way to practical success, and every year added surprises. John Canton, who was born at Stroud, in 1718, became a school-master, and invented valuable electrical instruments. He was the first man to manufacture powerful artificial magnets, and discovered that the air of a room can be electrified just like so many other things. Baccaria, a celebrated Italian, found that the air surrounding an electrified body itself becomes electrified. Then Robert Symmer made the amusing discovery that silk stockings and worsted stockings, when warmed and rubbed together, become so electrified that a Leyden jar can be filled with the current from them. More important was the

work of Henry Cavendish, the grandson of the second Duke of Devonshire, born at Nice, in 1731.

He was very rich, and very strange in his manner. He lived the life of a hermit in a beautiful London house. He hated the sight of strangers—not because he was an unkind man, but because he was so shy and modest. His female servants were never allowed to see him. If he had any orders for them he would write them down and leave a note on the hall table. Science was the great joy of his life. The chief thing that he did for electricity was to show that iron wire conducts electricity 400,000,000 times as well

as water does. By the aid of electricity he exploded oxygen and hydrogen, and got pure water as the result. Cavendish lived until 1810, and in his time two men arose who quite changed the method of producing electricity. One was Luigi Galvani, who was born at Bologna, Italy, in 1737, and died there in 1798. The other and greater was Alessandro Volta, born in 1745, at Como, where he died in 1827.

Galvani, when experimenting with an electric machine, found that the legs of a dead frog were set to work by an electric shock. He determined to see if lightning would have the same effect; but while he was fixing the frog by a copper skewer to the iron railing of his balcony, he saw the twitching renewed the moment the copper touched the iron. Galvani declared that the electricity existed in the tissues of the frog. When Volta heard of this, he set to work to prove that the body of the frog did not contain the electricity. He argued that it was produced by the contact of two different metals, and he proved that he was right. He placed a disk of copper on his table, and on top of that he placed a piece of cloth which had been soaked in sulphuric acid and water. On top of that he placed a disk of zinc. Next he added copper, cloth, and zinc again, and so on, in that order, until he had built up a pile. It was a pile of pairs of zinc and copper disks, each pair having a



HENRY CAVENDISH

moist piece of cloth between. Then he fastened a wire to the zinc disk at the top of the pile, and a second wire to the copper disk at the bottom of the pile.

ALESSANDRO VOLTA, THE MAN WHO MADE THE ELECTRIC BELL RING

Volta put the free ends of the two wires together, then separated them. As they were drawn apart, the electric current which had been set up in the pile caused a spark at the ends of the wires. Here, then, was the first instance of the manufacture of electricity by chemical action.

It was easy soon to improve on the Voltaic pile. Instead of placing the disks and cloths on the table, for the moisture quickly to dry up, he put the pile into a jar, or cell, filled with the water and acid. That was the Voltaic cell, which to this day is used for producing electricity by chemical action. This invention belongs to the year 1800, but more than a century afterward we still sometimes use the Voltaic cell as the battery for our electric bells, and all manner of other things.

This invention caused much excitement, and set men still harder to work. They found now that they could produce electricity in this way as they liked, and cause it to flow in a steady current over wires, not letting it fly away immediately it was created as it did from amber and other things. They found, among other things, that the current would heat wires, and this led at once to Sir Humphry Davy's discovery of the electric flame from which we get electric light, as we read on page 667.

THE DANISH PROFESSOR WHO TURNED THE COMPASS FROM THE NORTH

Now we must think for a moment of magnets. They had long been made. Soft iron could be magnetized by rubbing the loadstone upon it, but magnets like these soon lost their magnetism. Steel, after being magnetized by the loadstone, does not lose its magnetism. Once a magnet, always a magnet, with the hard steel. Now, many clever men had been wondering if there might not be some connection between magnetism and electricity, and Professor Oersted, a Danish scientist, living at Copenhagen, found, in 1820, that by passing an electric current from a Voltaic battery

through a wire he could alter the position of the magnetic needle. The magnetic needle is the little steel pointer of the compass which, when not interfered with, points to the north. Oersted found that, though the whole earth is one vast magnet, its power to attract the magnetic needle to the north is not great enough to prevent the point of the needle from being drawn aside by a strong electric current. Oersted showed that when the wire bearing the electric current is placed over the needle, the needle turns its head from the north to the east, but that if the wire be placed underneath the needle, the needle turns its head to the west.

What Oersted did sounds an interesting trick for a conjurer to do, but see what the effect of it was. The fact that an electric current turns the magnet is the beginning of the power which enables us to have telegraphs and telephones, and to do all the work of which the marvelous electric current is capable. Oersted had opened the door to the great field of discovery in what we call electro-magnetism. But the discovery did not remain there, or it would have been of no use to mankind.

MICHAEL FARADAY, THE BLACKSMITH'S SON WHO HELPED TO CHANGE THE WORLD

It remained for one of the finest English sons of science to carry the work to perfection. This was Michael Faraday, who was born in 1791, the son of a poor London blacksmith. After very little schooling he was apprenticed to a bookbinder, and after working hard all day he would study science at night. One day a gentleman, on entering the shop, found the boy at work binding an encyclopædia, and studying hard at the article in it on electricity.

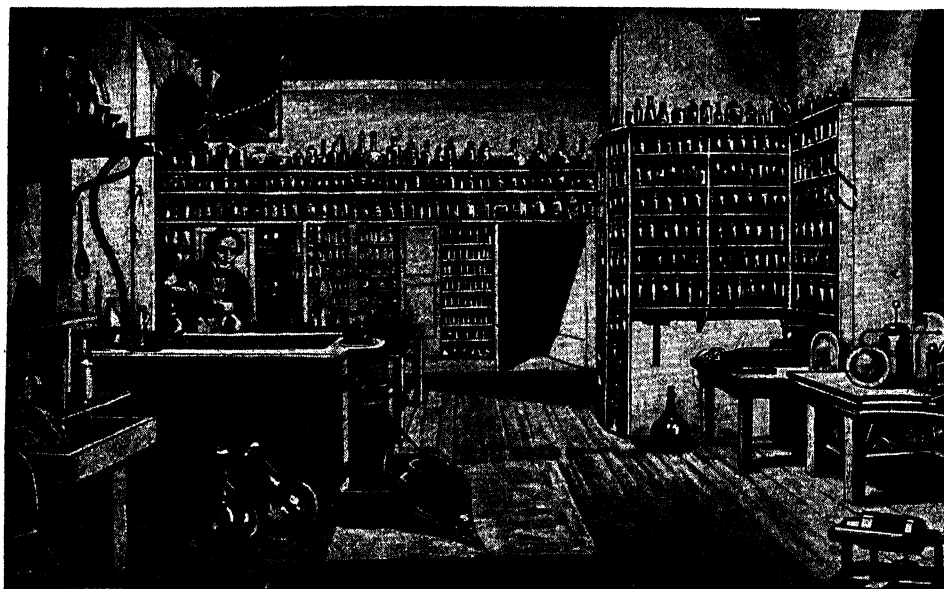
The gentleman was surprised to see a boy so interested in a subject of such difficulty, and questioned him. He found that Faraday, working late at night, had already been making experiments of his own, though he was too poor to possess anything but a home-made battery. The visitor was so pleased that he gave him four tickets for the lectures which Sir Humphry Davy was then delivering at the Royal Institution. Faraday was as much delighted as if someone had given him a fortune. He went to the lectures. He made notes

of what he heard, and then at the end of the lectures he went, in fear and trembling, to the great man and showed him his notes.

Davy was surprised to see what the boy had done. But he remembered how poor he himself had been as a boy, and how he had had to struggle to educate himself, and his heart warmed towards the humble apprentice. Faraday told him that he wanted to be a scientist, and Davy, after doing all that he could to test his faith, had the boy appointed as his own assistant. He helped him in his education, he took him on the Continent and let him make numberless experiments, and in course of time, when

found that the electric current will turn the magnetic needle. Faraday worked until he discovered that the magnet will electrify wire through which no current is passing! That clearly established the relationship between magnetism and electricity.

The result of this was of great importance. It meant that men no longer had to depend upon the small current of electricity which was chemically produced in the jars or batteries. First of all we have a coil of wire which, when electrified and placed near a magnet, itself becomes a magnet, with a north pole and a south pole, the north pole of the wire being attracted by the south pole



Michael Faraday was a poor boy who taught himself and became a great scientist. In this picture we see him at work in the laboratory of the Royal Institution, where he made many of his wonderful discoveries.

Faraday had grown up and become famous for his work in science, he succeeded the great man who had been so good a friend to him.

Faraday's life was a long, beautiful story of good and wonderful achievements. He did more for scientific learning than any other man of his day. His lectures and writings were upon the most difficult subjects, yet he wrote and talked so simply that even children could understand him and find delight in his words. All that he did for science is too much for us to talk of here; but the thing which we have to note is one of his wonderful discoveries concerning electricity and magnetism. Oersted had

of the magnet, and the south pole of the wire being attracted by the north pole of the magnet; while the north pole of the magnet drives away the north pole of the electrified wire, and the south pole of the magnet drives away the south pole of the wire. But we can make the north and south poles of the wire change places. If we send the current in by one end, then the front of the wire is the north pole; if we send the current in by the other end of the wire, then the back part of the wire becomes the north pole. The moment the current is turned off, or the connection broken, as we say, the coil of wire ceases to be a magnet.

William Sturgess, in 1825, made an electro-magnet of the highest value. He found that if we take a piece of soft iron and wrap wire about it, it becomes a far more powerful magnet, when electrified, than the ordinary magnet itself, and of course it can be made a magnet or not a magnet as often as we turn the current on or off. That gives us a powerful magnet which, as we have seen, can electrify any other coil of wire brought near it.

Faraday, working on, found that the coil of wire, on coming near the magnet, passed through what he called lines of force—certain avenues through which the magnetic influence is traveling. There-

seems to be no limit to the wonders that can be performed with its aid. The electric current, that controls the electro-magnets of which dynamos are composed, can be switched on and off at will, and one moment a powerful engine may be a thing that seems endowed with life, and the next an inert, helpless mass of dead machinery. Powerful magnets are now made which enable us to lift great weights, such as we see on page 5527; to telegraph and telephone; to drive engines powerful enough to draw a train, or drive a battleship. Our cities and homes are lighted, and our factories are worked by electricity, and we can warm our houses, and cook our food by elec-



This picture shows us a wonderful experiment which proved to men for the first time the immense pressure of the atmosphere. Otto von Guericke made two large metal cups with rims fitted against one another so closely that no air could get inside. He then pumped the air out with an air-pump so that there was practically nothing inside; the two cups then held together so that it took fifteen horses to pull them apart.

fore the more often that the coil passed through these lines of force the more often would it feel the effects. The next step, therefore, was to make a coil of wire which was attached at its ends to a revolving wheel. The coil, by turning round rapidly, received repeated impulses from the magnet. The current set up in this coil can be led away by wires into a receiver and stored, to be sent over wires hundreds or thousands of miles long, to do all manner of work, as often as it is wanted.

The greatest part of the foundation of electric science had now been laid, and the work of applying it began, and for this machinery had to be made. The first electro-magnet that Faraday made was very simple, but since his time many of the best electricians have devoted much attention to it, and now there

tricity, if we choose. Electricity is used to light the furthest corners of the blackest coal mines, and to drive fans to keep the air pure and make the life easier for the miner. Magnets are made for use by surgeons in drawing pieces of metal from wounds, and patients are saved from the added danger caused by probing for the missiles that wounded them. We start our motor cars with the aid of electricity; it provides the soldier in the trenches or the woodsman in the forest with a torch to light the darkness of his path, and we are all familiar with the wonderful path of light thrown by the searchlight on the sea or sky.

The electric telegraph was the first use to which electricity was put. Long before the invention of the telephone, and before any one so much as thought that trains or boats could be driven by elec-

tricity, our fathers were familiar with the fact that messages could be flashed along the wires stretched along the country road, and children held their ears to the tall poles to listen to the vibration of the wind through the wires. They thought it was the song of the messages, as they sped upon their way. Many men gave the best powers of their mind to the invention and improvement of telegraph instruments, but these men have a place for themselves in the story which commences on page 4441.

A MAN WHO WORKED OUT A GREAT THEORY BY MATHEMATICS

The next great student of electricity with whom we have to do is James Clerk Maxwell, a Scotchman, who was born in Edinburgh in 1831. He did so well at school that he had reached the university when most boys are only ready for the high school, and at fifteen was known as a genius, who had already written on scientific subjects. From Edinburgh University he went to the University of Cambridge, where he also made himself a name, and was afterward professor successively at a college in Aberdeen, at King's College in London, and at Cambridge University. As well as being a great electrician, he was a great mathematician, and it is in his mathematics that his interest for us lies.

When Michael Faraday was working out the relationship between magnetism and electricity, he knew that he had to do with what he called a "field of force," and Joseph Henry found that when he made experiments in one part of his house, his instruments in another part of the house were affected by the electricity. Neither of them was able to go any further into that side of the problem of the great power with which they were dealing, but Clerk Maxwell attacked it with the help of mathematics, and solved it. He said that electricity causes waves in the ether, which fills all space, and that light and heat are caused by these electric waves, which penetrate all matter. This is the electro-magnetic theory about which we read on page 5244.

A MAN WHOSE NAME WAS GIVEN TO THE ELECTRIC WAVES

Clerk Maxwell wrote a very learned book to set out his theory, but he went no further into the matter, and he died in the year 1879. Some years later, however, the subject was taken up by

another scientist, Heinrich Rudolph Hertz, a native of the free city of Hamburg, where he was born in the year 1857. When he was about twenty, Hertz went to the University of Munich to learn to be an engineer; but fortunately for the world he changed his mind, and went to the University of Berlin to study science. He quickly made a name for himself in his chosen subject, and when he was twenty-three, he took his doctor's degree with honors. He then became an assistant to one of his old professors, and about three years afterward, he went to the University of Kiel as a privat-docent, or instructor.

While he was at Kiel, he went deeply into Clerk Maxwell's wave theory of light and electricity, and made many experiments in an effort to prove its truth. He was entirely successful. With the simplest of instruments, he detected the electric waves in the ether. He measured their speed, and found that they have the same quickness, or velocity in space as the waves of light. His great work astonished the world, and the electric waves were named Hertzian waves in his honor. After this, he was made a professor at the University of Bonn, and died there in the year 1894.

Hertz knew that he had done a great work for science, but he never knew its importance to the practical, everyday life of the world, and in a few years his fame was overshadowed by that of Guglielmo Marconi, a young Italian who is now famous through all the world as the man who gave us the wonders of the wireless telegraph. We may read more of him in another place in our book.

THE MAN WHO DISCOVERED THAT ATOMS CAN BE DIVIDED

The last man of whom we shall speak in this part of our story is Sir Joseph Thomson, who discovered the existence of the wonderful electrons, of which we read on page 5356. He was born in 1856, near Manchester, in England, and as a youth attended Owens College in Manchester, and from that institution he went to Cambridge, where, like Clerk Maxwell, he made a name in mathematics. He afterward became a professor at Cambridge University and also a professor at the Royal Institution in London, and is still hard at work, trying to learn new secrets for mankind.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 2321.

The Book of OUR OWN LIFE

WHAT THIS STORY TELLS US

WE have already studied the use and care of the teeth. Besides the teeth, however, there is much more of interest and importance in the mouth. In these pages we study the lips, the lining of the mouth, and the fluid which it produces, and we learn that when we eat there pours into the mouth something that makes chemical change in the food to prepare it for its entry into our blood. The importance of chewing is that it helps this saliva to do its work upon the food. The last part of the mouth we have to study is the tongue, a wonderful muscular organ which is of the greatest importance not only in speaking, but also eating and tasting. We learn here, also, about the different kinds of taste, and why it is good for us that we are able to taste at all.

THE MOUTH AND EATING

THE lips are very interesting and important. They should meet so that the mouth is closed, except when we eat or speak. The mouth is not meant for breathing, as we have seen. The lips are very richly supplied with nerves. That is one reason why they are sensitive and pleasant to kiss with. Their rich supply of nerves, making them sensitive, is also valuable because they are the guardians of this entrance to the body; and grit, and prickly things, and anything that is not fit for food, are delicately felt and recognized by the lips, which close and refuse to allow the unsuitable thing to enter, or else spit it out. It is very interesting and instructive, in the case of very small children, though it may annoy their parents, to see how quickly their lips detect and reject anything which they do not think suitable to swallow.

The lips are lined with very thin and delicate skin, and as this passes into the mouth it changes into another kind of surface, called a mucous membrane. The lining of the mouth—and of most of the interior surfaces of the body—is called by this name because it produces a smooth, thickish stuff called mucus. This is a most valuable material, though it is rather troublesome when we have a cold, and our noses produce too much of it. It catches microbes, so that they do not penetrate beneath

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it; and it is slightly antiseptic, or poisonous to microbes. It catches dust, too.

It ensures that, for instance, the inner surface of the lip and the surface of the gum shall move smoothly and easily against each other, and shall not stick. It is thus like the "lubricating oil" that is put into machinery—say, into the bearings of a bicycle or a motor-car—so that it may work smoothly. Also it covers over our food before we swallow it, so that it slides down smoothly and easily.

The production of mucus by the mucous membrane of the mouth is under the control of the nervous system, and can be disturbed by worry or fear, so that the mouth becomes dry and we can hardly swallow. Sometimes in India when one of a number of people is suspected of having stolen something, they are all made to take a mouthful of some dry food, like grain or rice, and are told to swallow it. The guilty person's brain is frightened and upset, and he cannot produce enough mucus to soften and coat his mouthful, and the consequence is that he cannot swallow it, and so is found out.

Into the mouth there also pours, when we eat, or see something we want to eat, a quantity of a very watery fluid, quite different from mucus, which is called saliva, or spittle. That is why we say our

"mouth waters" when we see something nice. Saliva is not produced in the mouth, but in special glands that lie in front of the ear, and also under the jaw—three in all on each side. They are called the salivary glands, and in poisonous serpents they produce the poison. The teeth that lie nearest the openings of these glands are usually the last to decay, since saliva is alkaline, and, as we have seen, combines with the acids that would destroy the teeth—so that they are saved.

WHAT MUST HAPPEN TO OUR FOOD BEFORE IT CAN BRING US STRENGTH

We have lately learned that saliva is very important indeed. It is not merely that it softens the food. It contains a special ferment, a very complicated chemical substance which has the power of turning starch into sugar. It can do nothing else; but there is starchy material in most of our food, and this starch must be fermented into sugar before it can be used by the body. In fermenting it is made into a liquid, and this helps to break up the food so that the rest can be more easily digested—that is, fermented—when it reaches the stomach. The stomach has no power whatever to digest starch, and so it is a very serious matter if enough saliva, containing the starch-ferment, is not produced in our mouths and thoroughly mixed with the food when we eat.

If we bolt our food, that is what happens; we lose the value of much of it, and often get indigestion. On the other hand, if we thoroughly chew our food we get plenty of saliva into our mouths. It has been proved that chewing brings the saliva into our mouths; indeed, we can notice this for ourselves.

HOW TO EAT—A VERY IMPORTANT THING THAT EVERYONE SHOULD KNOW

As we chew, saliva and food get mixed together; then a round lump of the mixture gets smoothly coated with mucus, and it is *now* ready to be swallowed, but not before. After it has been swallowed, the starch is digested by the saliva and turned into sugar, in which form it can be taken into the blood and used to give us warmth and strength. The digestion or fermentation takes place after swallowing; not the stomach, however, but the salivary

glands produce the ferment that does the digestion. Therefore this is the one part of the business of digesting our food that we have under our own control, for we can chew or not, as we please.

If this first stage in digestion is properly carried out, it helps all the rest, as we have seen, because the melting out of the starch from among the food enables the juices of the stomach to get at the rest of it; and in everyone, but those who are really ill the whole business of digestion, from first to last, will go on well and easily *if* we have been wise enough to start it rightly by chewing our food properly. Everyone should know this, and every child should learn to chew. It does not take long before we get into the *habit* of chewing properly. If we take the trouble to attend to it at first, after a time the brain gets accustomed to making the jaws work properly before anything is swallowed, without our having to think about it. That is a good habit, and one of the best. Nor is it at all more difficult to learn than bad habits; and they are easy enough to learn, I am sorry to say.

PROPER EATING IS THE FOUNDATION OF GOOD HEALTH AND USEFULNESS

I know that we find it tiresome to be told, again and again, to chew our food properly before we swallow it; but the habit of breathing only through the nose, about which we have already read, and this habit of chewing properly, lie at the foundation of good health, which means the first condition of happiness and usefulness in this world. It would be a waste of time to study the body and learn how it is made, and how it works, if we could not thereby learn how to keep ourselves well; but we *can* so learn, and that is the best reason why we should study the body, even until we know a thousand facts about it for every one that we know yet. We know very little really, but we should act on what we do know, and then our *knowledge* becomes a better thing still, and that is *wisdom*.

I have not told you the name of the ferment in the saliva, nor the names of the various salivary glands, nor have I written the chemical equation which shows how starch is changed into sugar simply by combining water with it. These things are interesting, but they

do not matter. What really matters is to know what is our duty to our own bodies, and to do it.

But in studying the mouth we find, besides the lips that bind it, the mucous membrane that lines it, the teeth that arm it, and the saliva that pours into it, another wonderful organ, and that is the tongue.

THE CLEVERNESS OF THE TONGUE, WHICH HELPS US TO EAT AND TO SPEAK

There is scarcely any end to the usefulness of the tongue. That is true of the tongues of the lower animals even; but it is still more true of our tongues, as they are used by us for speaking with. So important is the tongue as an organ of speech that we often say "a foreign tongue" when we mean a foreign language, and even when we say language we refer to the tongue, for *lingua* is Latin for the tongue.

The tongue is really a group of muscles—some running along it from root to lip, some running across it, and so on. Any of these muscles can be used apart from the others, or in combination with them, so that we can move the whole tongue in any direction; we can lengthen it or shorten it, we can hollow it out to make a loud noise as a baby does when it cries, and as every good singer has to learn to do, or we can make it arch itself like the back of a cat, as we do when we pronounce the vowel *e*. It is one of the most remarkable things about our bodies that we can use for special human purposes, like speaking, organs which the lower animals have, and which were not originally meant for such purposes.

For the tongue's most ancient uses, to which we still put it, are quite different. It searches the mouth, and finds the food in it. In some animals, like monkeys that have cheek-pouches, it stows the food away till it is wanted. Little boys—and girls, too—sometimes use it for this purpose when they have sweets given to them.

THE WONDERFUL WAY IN WHICH THE TONGUE HELPS US AT MEALS

The tongue is used every time we swallow. It is the clever tongue that moves the food about so that it shall be properly caught between the various teeth, and cut up, and chewed; it is the tongue that rolls a portion of a mouthful into a round ball, slips it on to its own

surface, far back, and then tosses it into the throat, where it is swallowed. Try to eat or to swallow without moving your tongue, and you will soon learn how useful it is.

The tongue, too, keeps the mouth clean and free from anything it does not want to swallow. It is the tongue that discovers the bone in the fish, and catches it and pushes it to the lips so that we can get rid of it. So, like the lips themselves, it is a sort of sentinel, letting pass into the interior of the body only what it thinks right. We do not use our tongues for washing anything but our mouths and the outside of our lips, but many animals use it as sponge, and towel, and nail-brush as well as tooth-brush—which is a purpose we all put it to. Watch a cat washing herself or her kittens, and see how useful her tongue is in this way. Then you may let your finger rub against the surface of her tongue, and you will find it very rough indeed. The cat's tongue is far rougher than ours, and here again is a lesson as to the kind of food we are best suited for. The cat is a carnivorous, or flesh-eating, animal, and its tongue is a rasper, or grater for flesh.

THE FOUR KINDS OF TASTE THAT THE TONGUE GIVES US

The tiger's tongue will draw blood from your arm if you allow it to lick you. When we examine the tongue of such an animal, we see that it is armed with a number of sharp things standing up from it, and curved backwards.

Our tongues are comparatively smooth, for we are certainly descended from creatures which were vegetarian, and did not need such rough tongues as the tiger scrapes his bones with when the keeper feeds him.

But, beyond all these other uses, the tongue is wonderful because it is the organ of taste. It is covered with special little points, to which the nerves of taste run from the brain. These taste-bulbs, as they are called, are most abundant on the sides of the tongue and at its tip. They are much fewer on the back of the tongue, which is more used for rolling and throwing the food into the throat. Different parts of the tongue are different in their sensitiveness to different kinds of taste. There seem to be four principal kinds of taste, and it may be that there

are special nerves, and perhaps special taste-bulbs, in the tongue for each of these kinds. They are *sweet, salt, acid, and bitter*. Other tastes, which we cannot call exactly any of these four, are probably made up of mixtures of these, and also of smell. Smell has more to do with what we call the taste of our food than we fancy. When we have a cold and cannot smell, our food does not taste nearly so nice.

THE POWER OF TASTE AND ITS USES TO US ALL

We may notice that two of the classes of taste—acid and salt—correspond to two great classes of chemical compounds about which we read on page 1813 of this book. Sweet corresponds to the compounds called sugars; and bitter things perhaps belong to a special chemical class, too. We must never confuse *acid* with *bitter*, as many people do. They do not call bitter things acid, but often you may hear someone say that a thing is bitter when it is not bitter at all, but acid. They might just as well call it sweet. There is no resemblance at all between the taste of a lemon, which is acid, and the taste of quinine, which is bitter.

The tongue, then, besides being the principal organ of speech in human beings, is the organ of taste, and we should know what the use of the sense of taste is. We usually think of it as if it were just meant to give us *pleasure*. But none of our senses exist in the first place to give us pleasure. They exist for sheer usefulness. Music and beautiful sights give us pleasure; but the *first* use of the ear and the eye is that we may hear and see things, and so be helped in our actions. And though we use the sense of taste mainly for pleasure, its real business is the *use* of telling us what is and what is not fit to eat.

HOW THE TONGUE ACTS LIKE A SENTINEL TO GUARD US FROM HARM

Thus the tongue is a sentinel because it is the organ of taste as well as because it is an organ of touch, and can feel things, like bones, that it would hurt us to swallow. It is a sentinel *chemically*, because it tells us, by taste, what we require to know regarding the chemical composition of our food. It recognizes sugar, and approves of it, because sugar is good for us. It recognizes the things which are made in food

when it goes bad, tells us that they are there, and that they are nasty. So we are saved from the harm they would often do to us if we swallowed them. The tongue, like every part of the body, may make mistakes; but the duty of telling us what is good and what is not is what the tongue exists for in so far as it is the organ of taste.

I do not think that the sense of taste exists in order to tempt us to eat. When we are really hungry, we can enjoy dry, stale bread, which has scarcely any taste. People who have lost their tongues or their sense of taste still get hungry, like other people. The power of taste exists not to persuade us to eat, but to help us to choose.

We see this when we say that a person has "good taste." We mean not that he is hungry for music, for instance, but that he *chooses* well between good music and bad music; and "good taste" in clothes does not mean that a man likes to be clothed—he likes that whether he has "good taste" or "bad taste"; it means that he chooses well between dull colors and beautiful colors, "loud" clothes and quiet clothes. Let us think of taste, then, as the chooser; and let us try not to cheat our tongues by adding large quantities of strong-tasting things to our food.

WHAT HAPPENS WHEN WE SWALLOW OUR FOOD

Lastly, the mouth and the tongue have the business of swallowing. When the food is prepared, but not before, it is placed on the back of the tongue near the throat. A hint is thus given to the brain, and the "swallowing-centre"—a group of nerve-cells in the brain which has this duty entrusted to it—gives orders which close the opening that leads to the lungs, raise the soft palate, or curtain, at the back of the roof of the mouth so that the food shall not pass into the nose, and contract the muscles of the throat in a regular wave, so that the food passes safely into the gullet. The gullet is a very long, muscular tube, which passes right through the chest, and through a passage in the diaphragm, finally opening into the stomach. This tube contracts from end to end, pushing the food along until, in four or five seconds, as a rule, it enters the stomach, where we must now leave it.

THE NEXT PART OF THIS IS ON PAGE 2363.

